

The IRON AGE

April 24, 1958

A Chilton Publication

The National Metalworking Weekly



Tool Engineers' Show Issue

**More For Your
Nonferrous Machining
Dollar P. 113**

**Air Freight Finds
Niche in Metalworking — P. 83**

**Plating Equipment:
Makers Sell Automation — P. 190**

Digest of the Week P. 2-3

ARISTOLOY

UNIFORM QUALITY FORGING STEELS

This upset forged pinion involved very exacting requirements. Specifications from a large automotive manufacturer called for a clean steel, of uniform quality and exceptional hot forging characteristics. Copperweld's precise melting of selected scrap in electric furnaces, and closely controlled deoxidation fulfilled the customer's demand for cleanliness and uniformity. Careful conditioning and processing before re-rolling developed the exceptional forging qualities he required. The result — another forging problem solved — another Aristoloy customer satisfied.

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Bethlehem High-Strength Bolts join structural members in new home of Chicago Sun-Times. Owner: Field Enterprises, Inc.; Architects-Engineers: Naess and Murphy; General Contractor: George A. Fuller Company.

Newsplant in Chicago has high-strength bolting

The new home of the Chicago Sun-Times is one of the most modern newspaper plants in the country. The aluminum curtain wall structure, on the north bank of the Chicago River, is nine stories high, and has a penthouse. Its total floor area is approximately ten acres.

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Bethlehem High-Strength Bolts save time in erecting steelwork because they can be installed quickly by means of a pneumatic impact wrench and holding wrench. Each bolt is used with two hardened washers, one placed under the head, the other under the nut. With this method, tight, sound joints are possible in a matter of seconds.

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IRON AGE

The

April 24, 1958—Vol. 181, No. 17

Digest of the Week in

*Starred items are digested at right.

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It can result in lower inventory and



packaging costs and many other
less obvious savings. Metalwork-
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to grow. P. 83

MERGER

Armco-National—Merger of two
companies dovetails operations
neatly. Armco will be in the pipe
business while National's produc-
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supply. P. 86

"BUY AMERICAN" TWIST

U. S. Firms Look Abroad—Can
you make overseas and sell U. S.?
Some U. S. companies are ponder-
ing this question as answer to
foreign competition. It's not with-
out drawbacks. P. 88

FOREIGN INVESTOR HELP

Agency Will Share Risk — If
you're considering an investment

Metalworking



overseas, help is available. Of course, the proposition must be sound. Manufacturing and processing have inside track. P. 89

OPERATIONS RESEARCH

Management by Numbers — Mathematical analysis is getting a foothold in steel operations. Although largely experimental, some mills are making practical applications. Others are getting a back-ground of experience. P. 90

TOOL SHOW FEATURES

HOW TO GET MORE FOR YOUR MACHINING DOLLAR

Nonferrous Metals — With few exceptions, nonferrous metals are easy to machine. But even an easy job can be done in a right or wrong way. This feature covers machining practice as it applies to four important groups of nonferrous metals: aluminum, magnesium, copper and titanium. P. 113

Aluminum Turns a Profit — Aluminum machines best at high speeds and moderate feeds and depths of cut. Important points to keep in mind are: to provide space for chip formation, to keep cutting edges sharp with smooth tool face surfaces, and to grind more rake than is common for machining steel. P. 114

Magnesium: Free - Cutting — Combining light weight, good corrosion resistance, and excellent machinability, magnesium continues to grow in popularity. Tests have

shown that high-speed steel tools last as long in cutting magnesium as carbides do in machining other metals. P. 118

Tips on Machining Copper — Each of five major classes of copper-base alloys has special and distinct properties. For top efficiency, tooling should be designed to fit the needs of the individual alloy. P. 122

Keys to Machining Titanium — Follow proper steps, and machining of titanium can be made simpler and more profitable. One major problem, generation of heat, is solved by increasing feed, lowering cutting speed, and supplying a lot of cutting fluid. P. 126

MARKETS & PRICES

BIG RESEARCH PUSH

Lead-Zinc Launch Program — The lead and zinc industries are banking on research to broaden markets and expand sales. More cooperation with customer industries urged by Strauss. P. 87

NEXT WEEK

MATERIAL COSTS

How to Cut Them — Raw materials for metalworking can account for up to 70 pct of total production costs. Next week's special feature shows how plants can successfully pare the expenses of non-manufacturing activities.

NONFERROUS MACHINING:

Doing the job the right way means greater efficiency, a better product, increased profit. This latest special report gives important pointers on machining aluminum, magnesium, copper, and titanium. P. 113

DESIGN MATERIALS

Featured at Chicago—Visitors at the ASME Design Engineering Show saw new design materials. On display were some developed for use in high temperature applications. P. 91

FARWEST SALES GUIDE

New and Expanding Firms — Expansion isn't marking time on the West Coast. New companies are setting up shop, existing ones are enlarging facilities. Here's list of those in California. P. 105

CERAMIC TOOLS

Record Speeds—Cemented oxide tools machine 1045 steel at rates up to 18,000 fpm. Tests are so successful they point to possible need for more rugged machines with more hp. P. 109

STRAINED OPTIMISM

Steel Men Are Hopeful—It may be just another case of grasping at straws, but steel mills see a slight change for the better. Several mills report an order pickup in April. P. 189



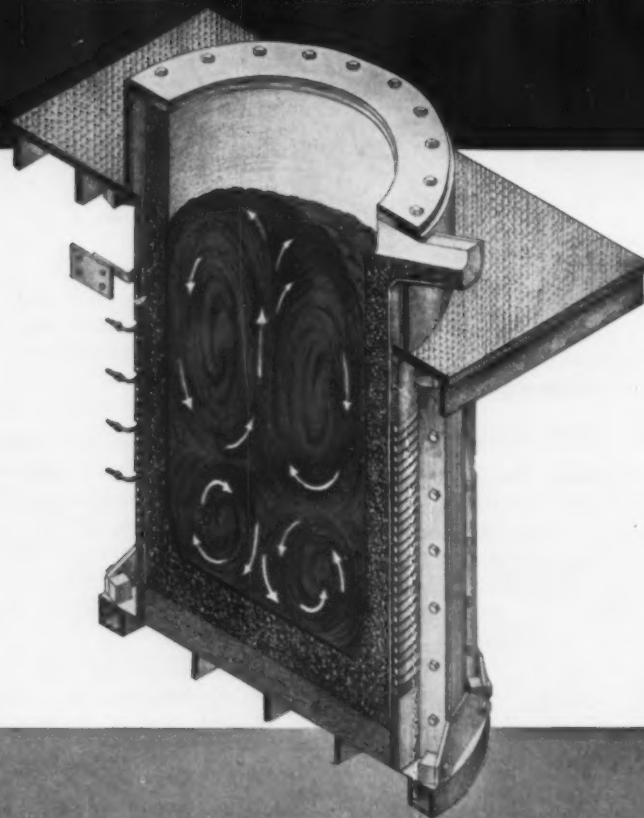
See it
at the Show*

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60 CYCLE
INDUCTION
MELTING
FURNACE**

★
A.F.S. FOUNDRY SHOW
Cleveland, May 19-23
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BULLETIN R-58

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This new principle was perfected in Europe over the last seven years. Over 100 Junker furnaces are now in use. AJAX-JUNKER designs are based on latest experience, using American components and practices throughout.

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MORGAN MILLS

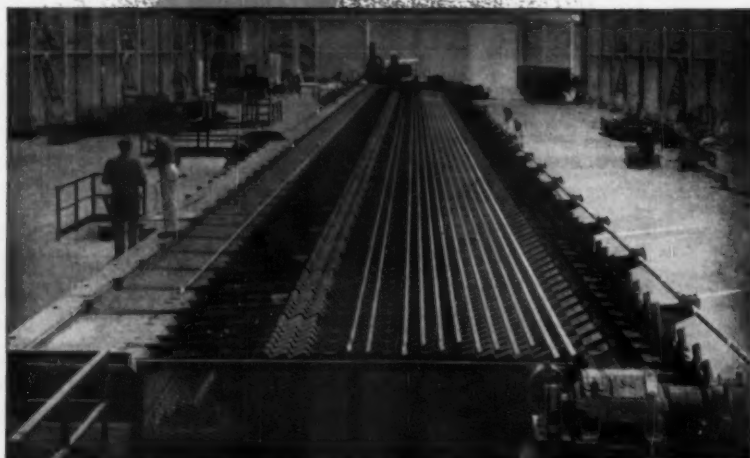
MORGAN QUALITY



MERCHANT AND ROD MILL
Atlantic Steel Company
Atlanta, Georgia

from
START
to
FINISH

Morgan engineered and equipped from charging car to cooling bed this new Atlantic Steel Mill is now in full operation. This mill is just one of two hundred and twenty-one Morgan continuous rolling mills which have been purchased by steel plants throughout the world.



MORGAN

WORCESTER

MORGAN CONSTRUCTION CO., Worcester, Massachusetts

Rolling Mills • Mergoil Bearings • Wire Mills • Regenerative Furnace Control • Ejectors • Gas Producers

You can make lighter-weight parts with 3 new grades of Armco High-Strength Steel



Sturdy, impact-resistant auto bumpers are made from Armco High Strength No. 3 because they often require considerable forming. They can be plated, too, for top appearance.

Because long service life is so vital in railway cars, Armco High Strength Steels No. 1 and No. 2 are specified for many key parts.

Now you can choose from three low-cost grades of Armco High Strength, Low-Alloy Steel—all offering the design advantage of strength with light weight, but each developed to do specific jobs.

Armco High Strength No. 1 offers a minimum ultimate tensile strength of 70,000 psi; a minimum yield strength of 50,000 psi. It has from four to six times the atmospheric corrosion resistance of mild steels, plus superior paint-holding qualities. For applications where fabrication is limited to flanging and light forming, it supplies superior strength and service life.

Armco High Strength No. 2 is more workable than No. 1, but provides equivalent atmospheric corrosion resistance, and only slightly lower mechanical properties.

Armco High Strength No. 3 meets the need for a strong, low-alloy steel that can be readily drawn or formed and has a surface suitable for plating after proper preparation. Although stronger, its corrosion resistance equals that of mild steels.

Why not investigate these new grades of Armco High Strength Steel? One may offer you the opportunity to give your product the sales benefit of light weight without sacri-

fice of strength. Just fill in and mail the coupon or contact your nearest Armco Sales Office.

Other Armco Steels for top-quality products include Stainless Steels, ALUMINIZED STEEL, ZINCGRIP®, ZINCGRIP PAINTGRIP®, Cold-Rolled PAINTGRIP, Enameling Iron, Electrical Steels, Welded Steel Tubing, Long Ternes, and high-quality Hot- and Cold-Rolled sheets.

ARMCO STEEL CORPORATION 1938 Curtis Street, Middletown, Ohio

Send me more information about these Armco High Strength Steels: ☐ No. 1 ☐ No. 2 ☐ No. 3

We make _____

Name _____ Title _____

Company _____

Street _____

City _____ Zone _____ State _____

ARMCO STEEL



ARMCO STEEL CORPORATION • 1938 CURTIS STREET, MIDDLETOWN, OHIO

SHEFFIELD DIVISION • ARMCO DRAINAGE & METAL PRODUCTS, INC. • THE ARMCO INTERNATIONAL CORPORATION

Industrial Retreat

A New Kind Is in Order

Each year thousands of men and women embark on a spiritual retreat. It is a short withdrawal from the everyday hurley-burley to a monastery or a church far from the work-a-day tension.

This detachment from normal daily patterns by men and women takes them to a place where they worship often, reassess their goals, and recapture or reaffirm their spiritual strength. There is a strict silence rule during most of the retreat.

That in a nutshell is the description of a spiritual retreat. Perhaps we industrialists and businessmen should use a somewhat similar method to rid ourselves of shallow thinking; and perhaps take up new and more vigorous aims in our business lives. It need not be religious in nature. But if it leans that way it is nothing to hide.

Such a business retreat could take place almost anywhere providing it is away from the usual physical interferences common to our work day. It could be carried out with few or many associates—provided rank and formality of business association are dispensed with.

How it is done is not nearly so important as what is done. The agenda would be simple, philosophical, and self-inquisitive. Certainly it

should leave the "big picture" items to the summer executive business course or seminar.

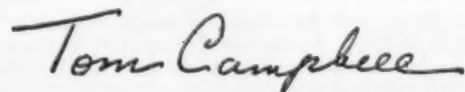
Our business retreat has more basic things to resolve. The answers are really to one's self—not to a group master or management head. For a starter we could ask ourselves how far we have gone in the pattern we set for ourselves years ago, and why we are having trouble meeting the goals we set when we were younger, more idealistic, and full of confidence and expectancy.

We could find out if and why we have strayed from the common or human touch. This would test whether or not we blindly follow an "approved" pattern towards others or whether we actually feel what we think we are conveying.

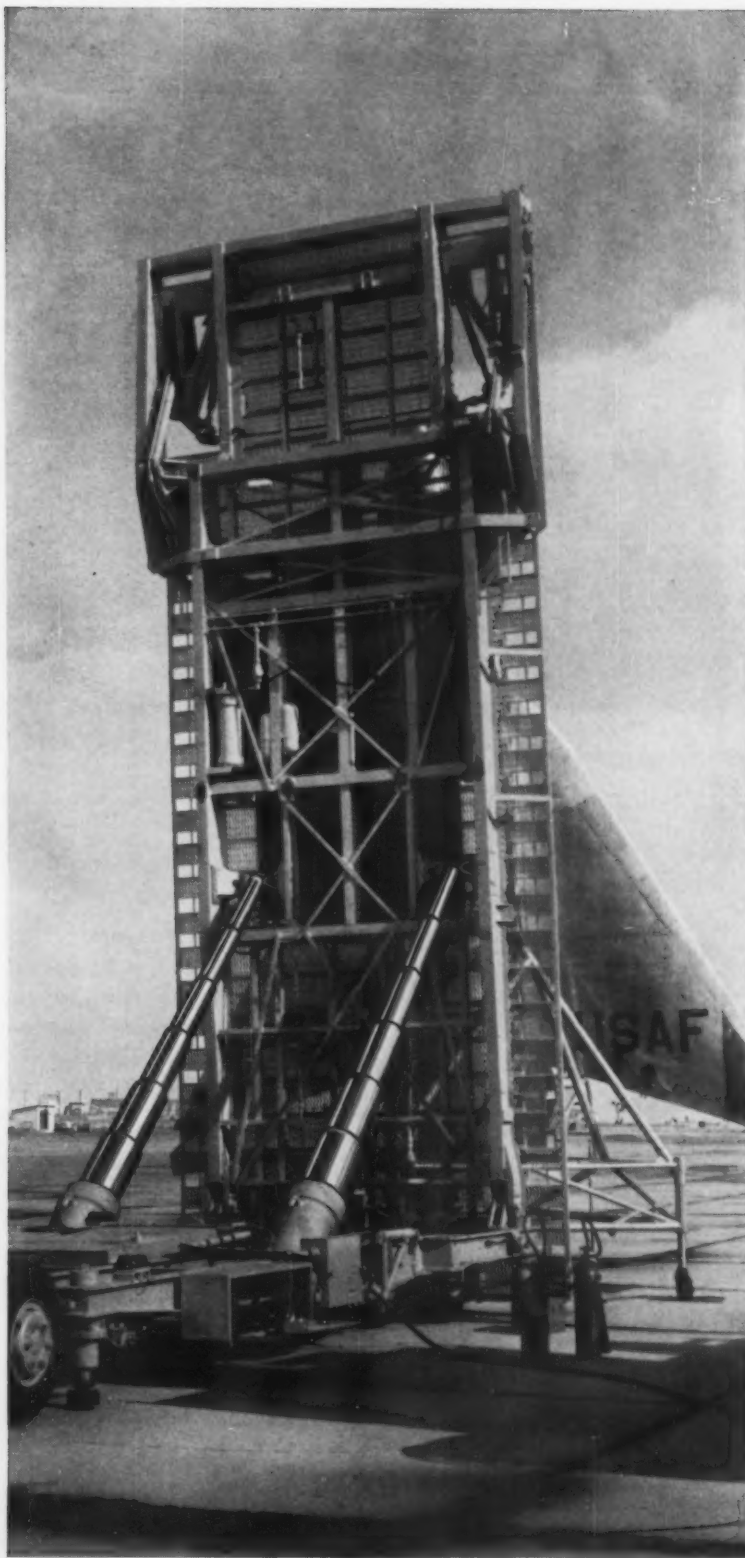
We might cogitate over the age-old question of whether or not we ever get anything for nothing. It would help our industrial humility too if we tabulate that part of our success which was due to help from others—and perhaps not yet acknowledged.

In this Spartan-like existence for a few days we could let our minds wander unfettered by the rules of getting ahead and living up to our alleged rank and social foibles.

The result of this retreat could be devastatingly healthy—and painful.



Editor-in-Chief



ALL CYLINDER COMPONENTS are structurally designed to withstand a shock impact load equivalent to a 3G landing of the aircraft. Stroke of the bed raising cylinders is 152½ inches; trunnion to pin eye centers, 179 inches extended—26½ inches closed. Cylinder inside diameters range from 14 inches in the mains to 5¾ inches in the smallest sleeves.

Hydraulic high-stretch from short closed position

THIS 9000 lb. vertical "landing field" and the aircraft riding piggy back are hydraulically positioned in just 3½ minutes by the two large COMMERCIAL six-stage telescopic cylinders. They stretch out over 10½ feet in playing a key role in the successful takeoff and landing of the U. S. Air Force Ryan X-13 Vertijet. In returning from vertical to horizontal position a double acting control in these cylinders enables the bed to be pulled over the center of gravity. Special features built into the first and sixth stages set up this unique operation. Once past the center of gravity, the cylinders return to their closed position by the weight of the bed and aircraft.

Here was another application problem that COMMERCIAL'S versatility in fluid power engineering helped to solve. If you have a fluid power problem involving pumps, valves, motors or cylinders, perhaps we can come up with the solution quickly and economically. Address inquiries to The Commercial Shearing and Stamping Company, Dept. K-17 Youngstown 1, Ohio.



CABLE ARM operating and cable tensioning cylinders, trailer outrigger jacks and two sizes of pumps to generate the fluid power for the hydraulic system were also furnished by COMMERCIAL.

COMMERCIAL
shearing and stamping

LETTERS FROM READERS

Slump Cures (Cont.)

Sir—I had supposed that ivory tower thinking was passe, but after reading Harriet Dolby's letter printed in the Apr. 3 issue I'm not so sure. I refer to her husband's statement:

"I still have a good job and so do millions of others. If every man who's working would guarantee to spend a hundred extra every month—or even fifty—in the buying of useful needed things it would do a lot."

I agree that if the millions who are working would spend an extra hundred every month it would do a lot, especially for our standard of living. But do you seriously believe there are millions of people who are saving a hundred dollars a month? The working man just doesn't have that kind of money.

I am reminded of the French queen who reportedly suggested the poor people eat cake because they had no bread.—A. E. Smith, Jr., Shelton, Wash.

■ While the majority of people may not be able to spend an extra \$100 every month, we do think that there is a need for more self-reliance to work ourselves out of the current recession.—Ed.

Sir—In your Report to Management (March 20 issue) you point out that although a tax cut will have influence on our present economic situation, "the benefits of a tax cut in halting a recession are not 100 pct sure. A tax cut will ease hardship and stimulate buying of necessities, which is desirable, of course. But it is not likely to get to the root of the case, developing the durable goods market."

I would certainly be interested in your thinking as to what could be done to help in the development of the durable goods market.—H. O. Gummere, Exec. Vice-Pres., Buck-

eye Tools Corp., Dayton, Ohio.

■ The problem of reviving the durable goods market is a difficult one. For some suggestions we recommend reading the editorial in the March 27 issue—"Heavy Industry's Plight — Faster Writeoffs Would Help," and our Special Report in the April 3 issue—"What's Needed to Revive Consumer Durables."—Ed.

Sir—Your most timely and properly stated editorial in the Feb. 27 issue of *The IRON AGE* put the ball in the hands of the "should be" carrier.

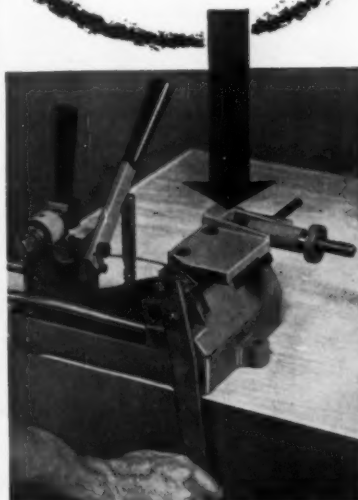
The materials handling field couldn't be better. However, you still have to go out and sell even the finest products. I believe industry has become possessed of the "order takers technique" during our years of shortages.

There has never been a greater market in the history of the country. But easy sales markets have dulled the sharp pencils of manufacturing costs departments. Now is a good time to examine our costs to see if we can't be competitive and sell what is to be sold before we holler.—F. W. Thiele, Vice-Pres., Mfg., American Planter Co., Burr Oak, Mich.



"A water cooler used to be in that corner."

make Springs
in Seconds!



Save Costly Special Orders
With the NEW

DI-ACRO Spring Winder

This unique machine eliminates costly special spring orders, saves valuable waiting time. Winds compression and extension springs to 1½" O.D. Handles round, flat and rectangular wire to ½" dimension. Note exclusive features in the hand operated Di-Acro Spring Winder which assure accurate tension and fast operation without special experience or skill.

new **TENSION CONTROL**—Simply adjust to desired tension—the control keeps it uniform, for winding one spring or hundreds, and releases when each spring is wound.

new **WIRE CUT-OFF**—After spring is wound, release tension and use cut-off lever to quickly cut end of spring to desired length.

new **CAM LOCK**—Simply feed wire under cam, turn handle and wire is securely locked to arbor while spring is wound. No threading required.

FREE-SAMPLE SPRINGS



Send us your spring forming problems — samples or dimension sketches—together with sufficient test material, and let us wind some sample springs for you free of charge. No obligation.

See Di-Acro machines at Booths 813-821
ASTE Show May 1-8,
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O'NEIL-IRWIN MFG. CO.
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How V-Belts with the Green Seal save you money

They're dimensionally stable — Exclusive 3-T Cords or unsurpassed steel cables muscle belts that don't shrink or stretch in storage. So matched sets *stay* matched. Down time is cut to a new low.

They're precisely measured — The length you need is the length you get. Mismatching failures are minimized.

They're high in modulus, low in stretch — Power loss through "creep" is virtually eliminated. Take-ups are few and far between.

They're friction-balanced, non-dusting — Their covers don't grab or stick in the grooves. They run smoothly and cleanly.

They're mildew-inhibited — They're safely stored and operated in high moisture. Stand-by drives always ready when needed.

—AND IT ALL ADDS UP TO

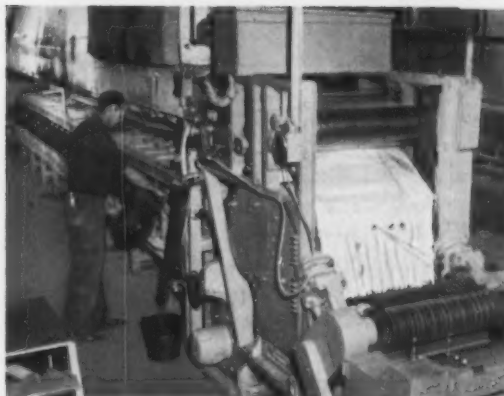
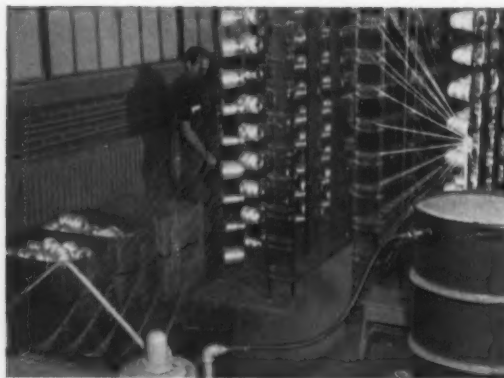
—Maximum trouble-free horsepower hours at minimum cost. It's reason aplenty that you should use only V-Belts with the Green Seal. See your Goodyear Distributor for details. Or write Goodyear, Industrial Products Division, Lincoln 2, Nebraska, or Akron 16, Ohio.

DIMENSIONALLY STABLE V-BELTS with the GREEN SEAL by

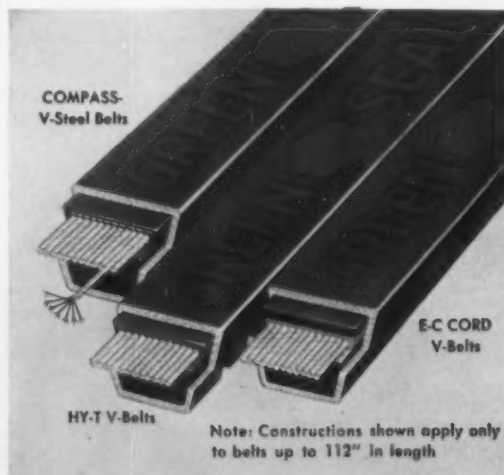
GOOD YEAR

THE GREATEST NAME IN RUBBER

Compass, E-C Cord, Hy-T, Green Seal—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio



Moneysaving performance is built into every Goodyear V-Belt in exclusive manufacturing processes like those illustrated above. Synthetic fiber cords are impregnated repeatedly with special rubber latex compounds. When treated at a precise tension and temperature for a precise time (the exclusive 3-T process), the cords are stabilized at the point of greatest strength before being built into the load-carrying section of Goodyear V-Belts.



FATIGUE CRACKS

Steel Valhalla

When the last steel stream has sputtered
Into the ingot mold,

When the thundering rolls are silent
And the soaking pits are cold;
When the last steel man has faltered,
And the mills are dead and still,
What of the Iron Men, Master,
Who tamed steel to their will?

Will they sit on a throne and tinkle
A glittering, golden harp?
Will they chase comets and rainbows
Or fish for celestial carp?
Will they find fun in the Cosmos,
Play with a burning sun?
Roll it, anneal it and tin it
And cuss 'till the job is done?

They'll want to play "ball" with
electrons,

Juggle a proton or two,
Tie knots in all the waste products
Which used to scoot up the flue.
They'll know why a 'melt' went
haywire,

With answers all cut and dried,
And then, will the life be worth it
For all these poor devils who
died?

And a burly bull of a foreman
Will look for a job to be done;
Round up the chipping hammers
To smooth off a lumpy sun.
They'll miss the salt sweat streaming
Down heat-flushed face and chest.
For without the Thunders of Chaos
Steel men will never rest!

—Richard C. Tiplady, Toronto,
Ont., Canada.

Cloud on the Horizon

Will the electronic age make editors obsolete?

We always scoffed at the idea, believing no collection of transistors and wires could ever compete with a living, breathing journalist. Now we're not so sure.

From New York comes word about a new machine unveiled at a recent convention of the Institute of Radio Engineers. It's a data processing unit which can "read" a magazine article and then write an abstract based on it.

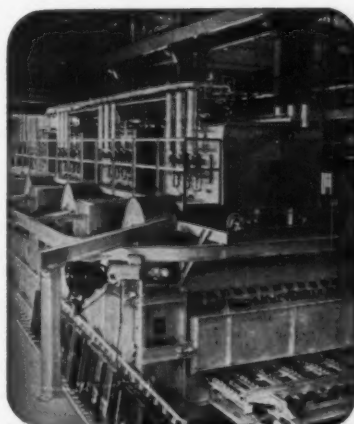
Well and good. But if it learns to write headlines and read proof, watch out.



SPEAKER OF THE DAY: On hand when Tom Campbell (second from right), The IRON AGE Editor-in-Chief, recently addressed the Sales Executives Club of New York were (left to right): John A. Carter, president, Oakite Products; Charles R. Cox, president, Kennecott Copper, and Max D. Howell, executive vice-president, American Iron and Steel Institute.

THE IRON AGE, April 24, 1958

HEAT TREATS ALUMINUM ALLOYS UNIFORMITY $\pm 2^{\circ}\text{F}$.



R-S FURNACES AT WYMAN- GORDON KEEP QUALITY UP ... COSTS DOWN

Where aluminum alloy forgings for 18,000 ... 35,000 ... and 50,000 ton presses must be heat treated to absolute uniformity R-S Furnaces were entrusted with the job. Six R-S Furnaces at Wyman-Gordon Products Corporation handle all types and sizes of forgings with extreme flexibility and maintain a uniformity of plus or minus 2°F . to 1100°F . Work is pushed thru furnace in steel trays in two rows on roller rails. Every piece emerging has absolute uniformity regardless of size, shape or weight.

For higher quality in heating and forging write for the illustrated folder giving full technical details to...

R-S FURNACE CO., INC.
NORTH WALES, PA.

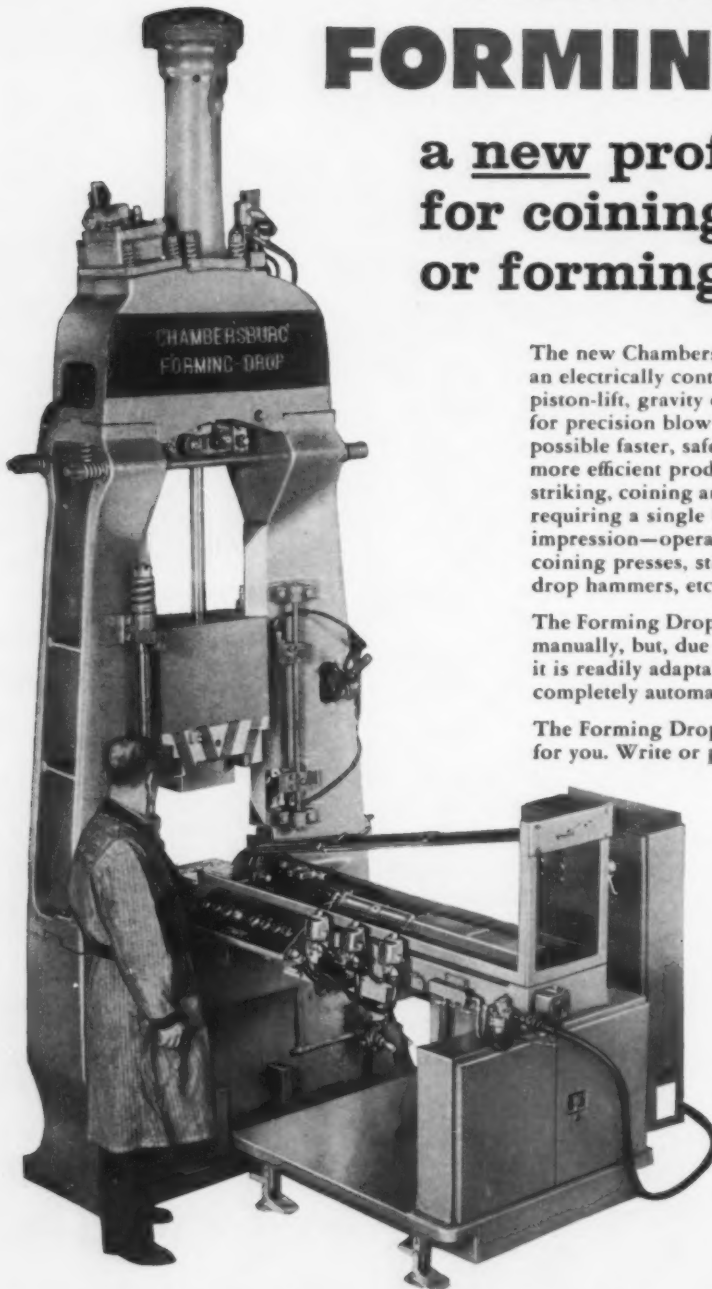


Car Hearth Furnaces
Continuous Furnaces
Rotary Type Furnaces



CHAMBERSBURG FORMING DROP

a new profit maker
for coining, embossing
or forming operations



The new Chambersburg Forming Drop is an electrically controlled, air-operated, piston-lift, gravity drop hammer, designed for precision blow control. It makes possible faster, safer, almost effortless, more efficient production on forming, cold striking, coining and embossing operations requiring a single blow in a single die impression—operations common to coining presses, strap hammers, pneumatic drop hammers, etc.

The Forming Drop may be fed and operated manually, but, due to its electrical control, it is readily adaptable to semi-automatic or completely automatic operation.

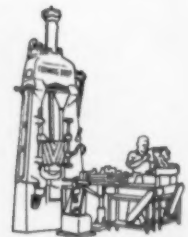
The Forming Drop may hold possibilities for you. Write or phone for further details.



SEMI-AUTOMATIC



MANUAL



FULL AUTOMATIC

CHAMBERSBURG ENGINEERING COMPANY CHAMBERSBURG, PA.

| | | | | | | | | |
|----------------------------|------------|------------|------------|-----------------------------------|--------------------------|--------------------------|-----------------------------|-------------------|
| <h2>CHAMBERSBURG</h2> | | | | | | | | |
| THE HAMMER BUILDERS | | | | | | | | |
| | | | | | | | | |
| CECO-DROP | STEAM DROP | CECO-STAMP | BOARD DROP | AUTOMATIC FORGING THE IMPACTER | FLAT DIE SINGLE FRAME | FLAT DIE DOUBLE FRAME | PNEUMATIC SELF-CONTAINED | TRIMMING PRESS |

COMING EXHIBITS

Tool Engineers Show — May 1-8, Convention Hall, Philadelphia. (American Society of Tool Engineers, 10700 Puritan Ave., Detroit 38.)

Foreign Metalworking—May 7-17, Coliseum, New York. (U. S. World Trade Fair, 331 Madison Ave., New York 17.)

Western Material Handling Show—May 8-10, Great Western Exhibit Center, Los Angeles. Information: 2809 Sunset Blvd., Los Angeles 26.)

Southwestern Metal Show — May 12-16, State Fair Park, Dallas. (American Society for Metals, 7301 Euclid Ave., Cleveland 3.)

Foundry Show—May 19-23, Public Auditorium, Cleveland. (American Foundrymen's Society, Golf & Wolf Rds., Des Plaines, Ill.)

Packaging Show—May 26-30, Coliseum, New York. (American Management Assn., 1515 Broadway, New York 36.)

MEETINGS

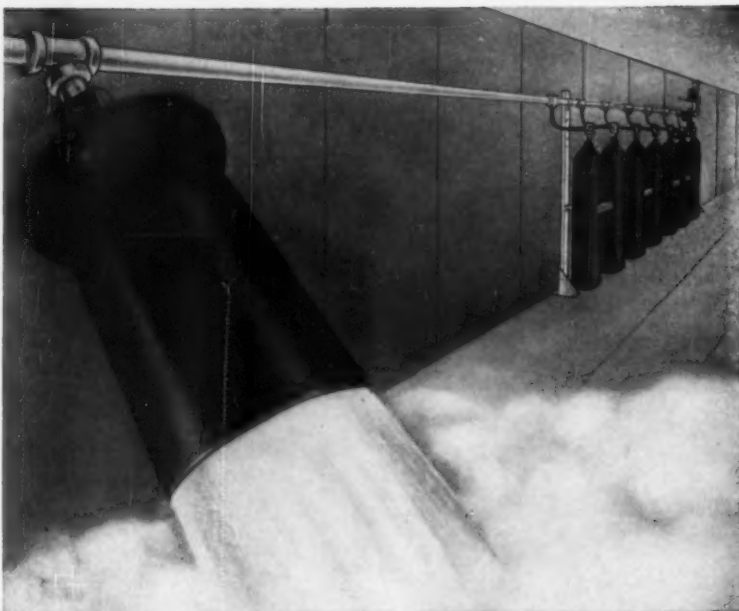
The Electrochemical Society, Inc.—Semi-annual meeting, Apr. 27-May 1, Statler Hotel, New York. Society headquarters, 1860 Broadway, New York.

National Assn. of Architectural Metal Manufacturers—Annual convention, Apr. 27-May 2, Shamrock Hilton, Houston, Tex. Society headquarters, 228 N. LaSalle St., Chicago.

Rail Steel Bar Assn. — Annual meeting, Apr. 28-30, The Inn, Williamsburg, Va. Society headquarters, 38 S. Dearborn St., Chicago.

Grinding Wheel Institute—Semi-annual spring meeting, Apr. 30-May 1-2, Grand Hotel, Point Clear, Ala. Society headquarters, 2130 Keith Bldg., Cleveland.

(Continued on P. 16)



24-HOUR-A-DAY AUTOMATIC FIRE PROTECTION!

Install a built-in Kidde Fully-Automatic Carbon Dioxide Fire Extinguishing System, and you install the finest, most dependable round-the-clock fire protection on the market today. Individually designed to fully guard even the most dangerous hazards, Kidde systems offer tailor-made fire protection for dip tanks, spray booths, oil bath air filters, record vaults, generator rooms . . . any hazard in which fire can develop and spread!

Because they use dry, clean non-damaging carbon dioxide as an extinguishing agent, Kidde systems can be installed to protect intricate machinery or delicate electrical equipment. Carbon dioxide smothers fire the instant it starts, then vanishes quickly into thin air. It leaves no mess, no clean-up job afterwards!

Kidde systems are pressurized — there are no falling weights, no clumsy mechanical triggering methods. Special rate-of-temperature-rise detectors trigger the system at the first flash of fire. Pneumatic control heads insure instantaneous and complete system discharge. All operating parts are self-enclosed for safety. Visual indicators show at a glance whether system is "set" or "released." Directional valves allow protection of more than one hazard from the same bank of cylinders. There are no parts to replace after a fire.

For more information on Kidde systems, and how they can protect your plant from fire, send the coupon or write today for Kidde's Engineered Fire Equipment Booklet.

WALTER KIDDE & COMPANY, INC.
449 MAIN STREET, BELLEVILLE 9, N. J.

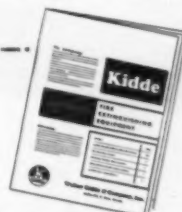
Please send me your Engineered Fire Equipment Booklet, I-19 and complete information on Kidde systems. I am interested in protecting the following hazards:

NAME _____

ADDRESS _____

CITY _____

STATE _____



Sound planning...

...is based on an **Osborn Methods Study**

Today—foundry production planning *really means*—foundry profit planning. There's a sound reason why: operating today's foundry takes methods and machines that *must* turn out *quality* molds and cores rapidly . . . *at a profit*.

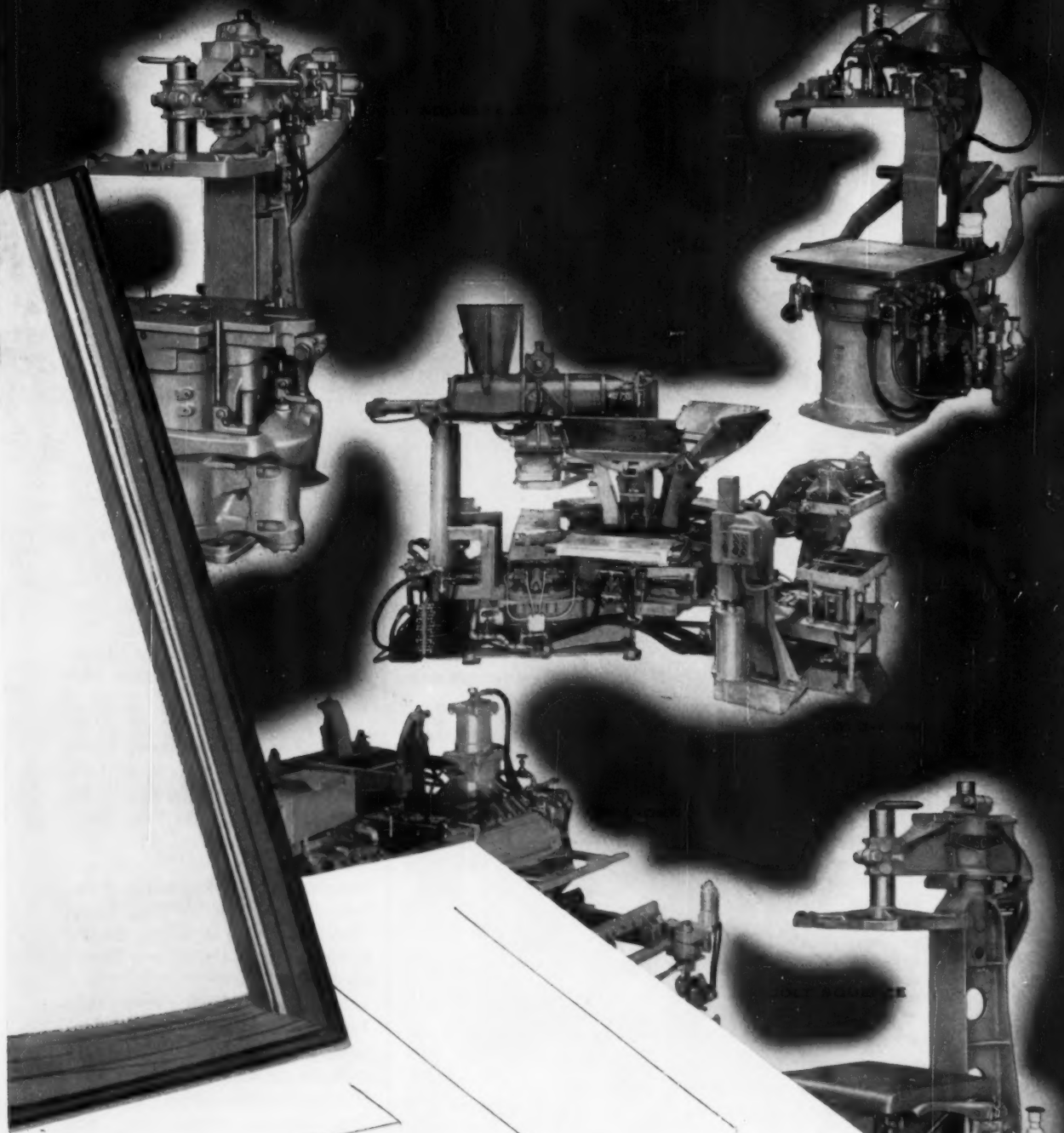
To do that job takes a special kind of planning and know-how. We call it the **Osborn Methods Study** . . . it's available to *you now* at no obligation.

To lower your costs . . . speed production . . . boost foundry efficiency takes today's most advanced thinking—today's most *sound planning*. For over 50 years, Osborn has *pioneered* in developing *advanced* methods and production-tested foundry machines designed to lower your costs . . . *increase your profits*.

The time to *plan for profits* is *now*. Our full staff of Foundry Specialists is ready to work with you . . . study your molding and core-making operations . . . show you *exactly* where you can *save time and money*.

Write us for full details on how you can use the **Osborn Methods Study** to *boost profits* in 1958. The Osborn Manufacturing Company, 5401 Hamilton Avenue, Cleveland 14, Ohio.





CLOSE

leader in mechanization for the foundry



MOLDING MACHINES
CORE BLOWERS
SHELL MOLDING MACHINES
BRUSHING MACHINES
INDUSTRIAL BRUSHES

New IRD system
makes troubleshooting easy,
cuts machinery maintenance costs

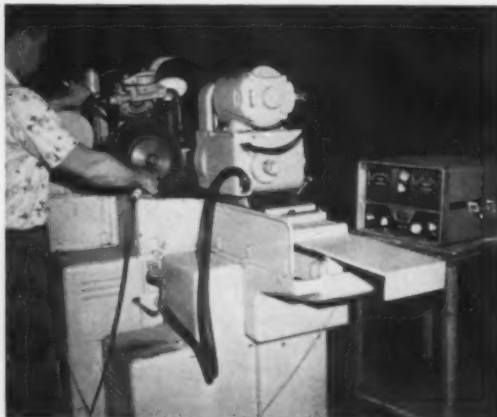
Bearing failure, fatigue, chatter, vibration, wear, noise eliminated with new multi-purpose IRD system, like this . . .

TROUBLESHOOTING

The portable Model 600 Vibration Analyzer pinpoints the parts causing machinery malfunction without costly dismantling, prescribes correction — reducing costly downtime.

IN-PLACE BALANCING

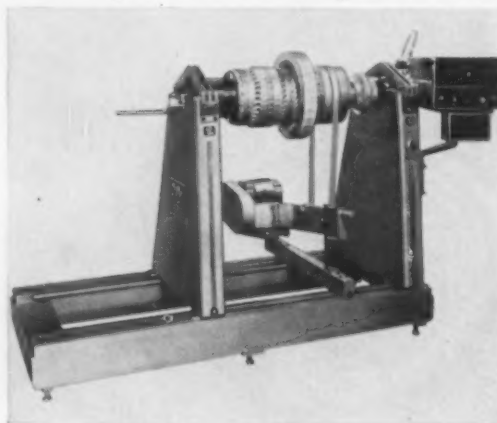
When the trouble is caused by imbalance, the Model 600 is used to dynamically balance rotating components at operating speed, in their own bearings, anywhere in your plant.



Avoid costly duplication of equipment by using the portable, multi-purpose Model 600 as the electronic brain of the IRD Dynamic Balancing Machines.

DYNAMIC BALANCING

IRD Models 101, 102, 103 dynamically balance motors, spindles, turbines, blowers and other rotating components simply, accurately and quickly.



Eliminate costly trial-and-error troubleshooting methods . . . make corrections accurately and quickly, balance components in place or separately. All these important functions are yours at a fraction of the cost of conventional, single-purpose balancing machines. Have an IRD man give you an in-your-plant demonstration, on your machinery.

IRD systems

INTERNATIONAL RESEARCH & DEVELOPMENT CORP.

6155 Huntley Rd., Worthington, Ohio

See us in Sweets' 1958 PE and MT files

EXHIBITS, MEETINGS

(Continued from P. 13)

National Screw Machine Products Assn.—25th anniversary meeting, (annual industry meeting), Apr. 30-May 3, Drake Hotel, Chicago. Society headquarters, 2860 E. 130th St., Chicago.

MAY

Machinery Dealers National Assn.—Annual convention, May 5-7, Eden Roc Hotel, Miami Beach, Fla. Society headquarters, 1346 Connecticut Ave., Washington, D. C.

National Welding Supply Assn.—Annual convention, May 5-7, The Americana, Miami Beach, Fla. Society headquarters, 1900 Arch St., Philadelphia.

National Assn. of Sheet Metal Distributors—Spring meeting, May 8-9, Sheraton - Blackstone Hotel, Chicago. Society headquarters, 1900 Arch St., Philadelphia.

National Assn. of Purchasing Agents—Annual convention, May 11-14, Conrad Hilton Hotel, Chicago. Society headquarters, 11 Park Place, New York.

American Steel Warehouse Assn., Inc.—Annual meeting, May 11-14, Riviera Hotel, Las Vegas. Society headquarters, 540 Terminal Tower, Cleveland.

Instrument Society of America—Annual symposium on instrumental methods of analysis, May 12-14, Shamrock-Hilton Hotel, Houston, Tex. Society headquarters, 313 Sixth Ave., Pittsburgh.

Society for Experimental Stress Analysis—Spring meeting, May 14-16, Manger Hotel, Cleveland. Society headquarters, P. O. Box 168, Cambridge, Mass.

Industrial Heating Equipment Assn., Inc.—Spring meeting, May 18-21, The Homestead, Hot Springs, Va. Society headquarters, 1145 19th St., N. W., Washington, D. C.



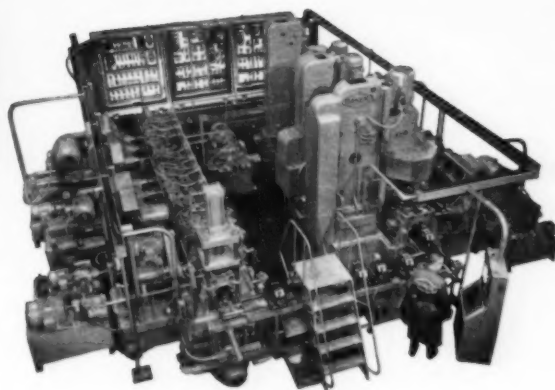
preferred . . .
because it is

reliable!

ALLEN-BRADLEY MOTOR CONTROL QUALITY

Twenty-six machining operations are performed automatically on this huge transfer machine. To keep this machine operating continuously—to avoid costly production shut-downs—Baker Brothers, Inc., selected Allen-Bradley quality motor control—the simple control that is good for millions of trouble free operations.

The recognized reliability of Allen-Bradley motor starters and relays is the result of their simple design. Having only *one* moving part, wear and consequent trouble are reduced to the minimum. The double break, silver alloy contacts . . . standard throughout the Allen-Bradley line . . . never need attention. They are always in perfect operating condition.



This Baker Automatic Transfer Machine is equipped with a special Allen-Bradley control panel, assembled from standard components listed in the latest A-B Handy Catalog.

Simplicity of design and silver alloy contacts are features of all Allen-Bradley control auxiliaries—they are similarly trouble free. Therefore, standardize on the Allen-Bradley line of *quality* motor starters, relays, push buttons, limit switches, and other accessories. You cannot possibly make a mistake!

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.

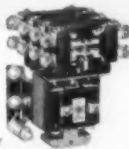
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

BULLETIN 802T Oiltight Limit Switch



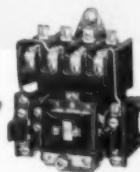
Has completely sealed operating head and switch body. This adjustable roller lever type saves installation time.

BULLETIN 700 Solenoid Relay



Universal type relay has contacts that can be connected for either "normally open" or "normally closed" operation.

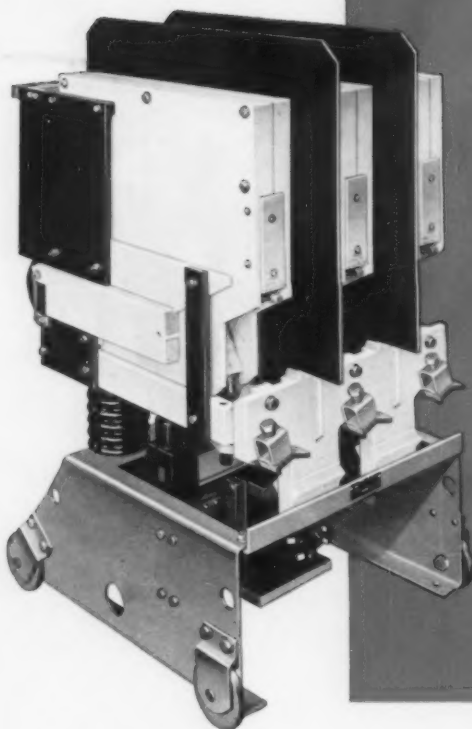
BULLETIN 709 Solenoid Starter (Size 1)



Popular across-the-line starter with accurate and reliable overload relays. 8 Sizes to 300 hp, 220 v; 600 hp, 440-550 v.

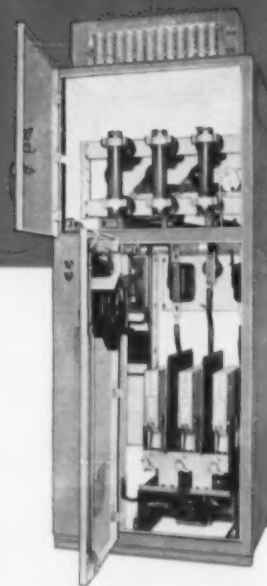
4-58-R





Air break starters

for high voltage motors



This new air break contactor—around which Allen-Bradley has developed a complete line of high voltage starters—is designed to match your *toughest* applications. It features the same solenoid design—with only *one* moving part—that has made Allen-Bradley low voltage starters universally recognized for their tremendous operating life.

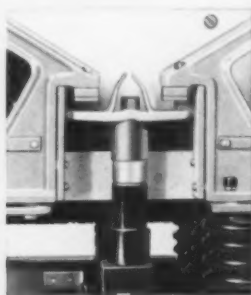
These new contactors are available in full voltage and reduced voltage starters—nonreversing or reversing—for squirrel cage, part winding, slip ring, and synchronous motors up to 1500 hp, 2300 volts; 2500 hp, 4600 volts. All starters are equipped with current limiting fuses and have an interrupting capacity of 150,000 kva at 2300 volts and 250,000 kva at 4600 volts.

It will pay you to investigate these *quality* starters. Complete information is contained in Publication 6080 . . . please send for your copy, today.

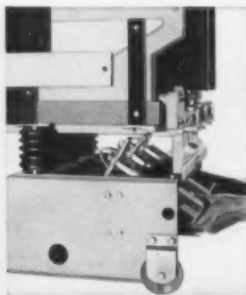
Bulletin 966 high voltage air break, across-the-line synchronous motor starter in NEMA Type 1 enclosure.



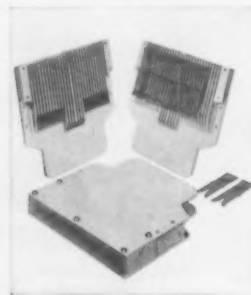
Only One Moving Part. Simple solenoid design eliminates trouble-causing pins, pivots, and flexible jumpers.



Double Break Contacts of silver alloy never need maintenance. Vertical motion assures uniform contact pressures.



Easy Access from Front. Crossbar and contacts removable from front, without special tools, for easy inspection.



Faster Arc Suppression. New blowout design and novel arc chute. Chutes are molded from an arc resistant material.

Allen-Bradley Co.
1316 S. Second St.
Milwaukee 4, Wis.

In Canada: Allen-Bradley Canada Ltd.
Galt, Ontario

4-58-MR

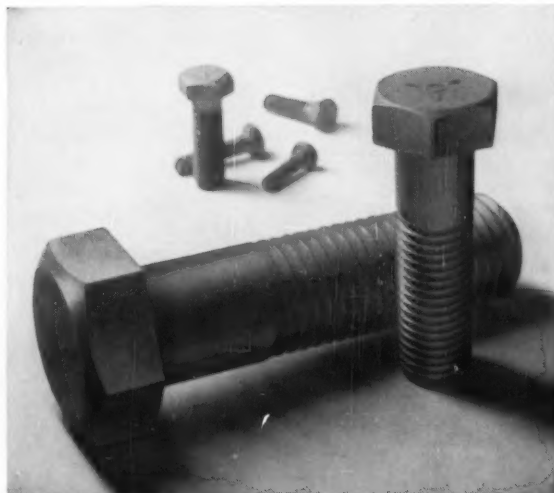
ALLEN-BRADLEY
MOTOR CONTROL
QUALITY

Cleveland—your best single source for threaded fasteners

Complete stocks of hexagon head cap screws, machine bolts, and socket screws for immediate delivery

Cleveland's complete line of standard fasteners now includes hexagon head cap screws, machine bolts, and socket screw products. And because we have the widest range of Boltmaker sizes in the world, we can furnish many of these products cold forged. This assures uninterrupted grain flow in heads, threads and fillets, better finish, and higher tensile strength and fatigue durability. Our new 1¼ in. Boltmaker, largest of its kind in the world, enables us to completely cold forge products in diameters up to 1¼ in. through 10 in. long.

Cleveland's extensive stocks and streamlined production facilities insure fast delivery of these quality products in any quantity from a package to a carload. Write today for full information, samples and prices.



Cleveland standard hexagon head cap screws up to 2½ in. are stocked for immediate delivery in bright, quenched and tempered steels—alloy steels on short notice. We specialize on extra-large diameters and long lengths.



Cleveland socket head products include cap screws, set screws, flat heads, button heads, shoulder screws, dowel pins, and pressure plugs. In a wide range of sizes, including miniatures. Many are available in both heat treated alloy steel and stainless.



Square head machine bolts up to 30 in., carriage bolts up to 20 in., lag bolts to 16 in., plow bolts to 3½ in.—all standard sizes. Larger diameters and longer lengths made to order. Also furnished in high carbon and alloy steels.

Cleveland hexagon head cap screws and socket screw products can be supplied with the Nylok* self-locking feature

*T. M. Reg. U. S. Pat. Off., The Nylok Corporation

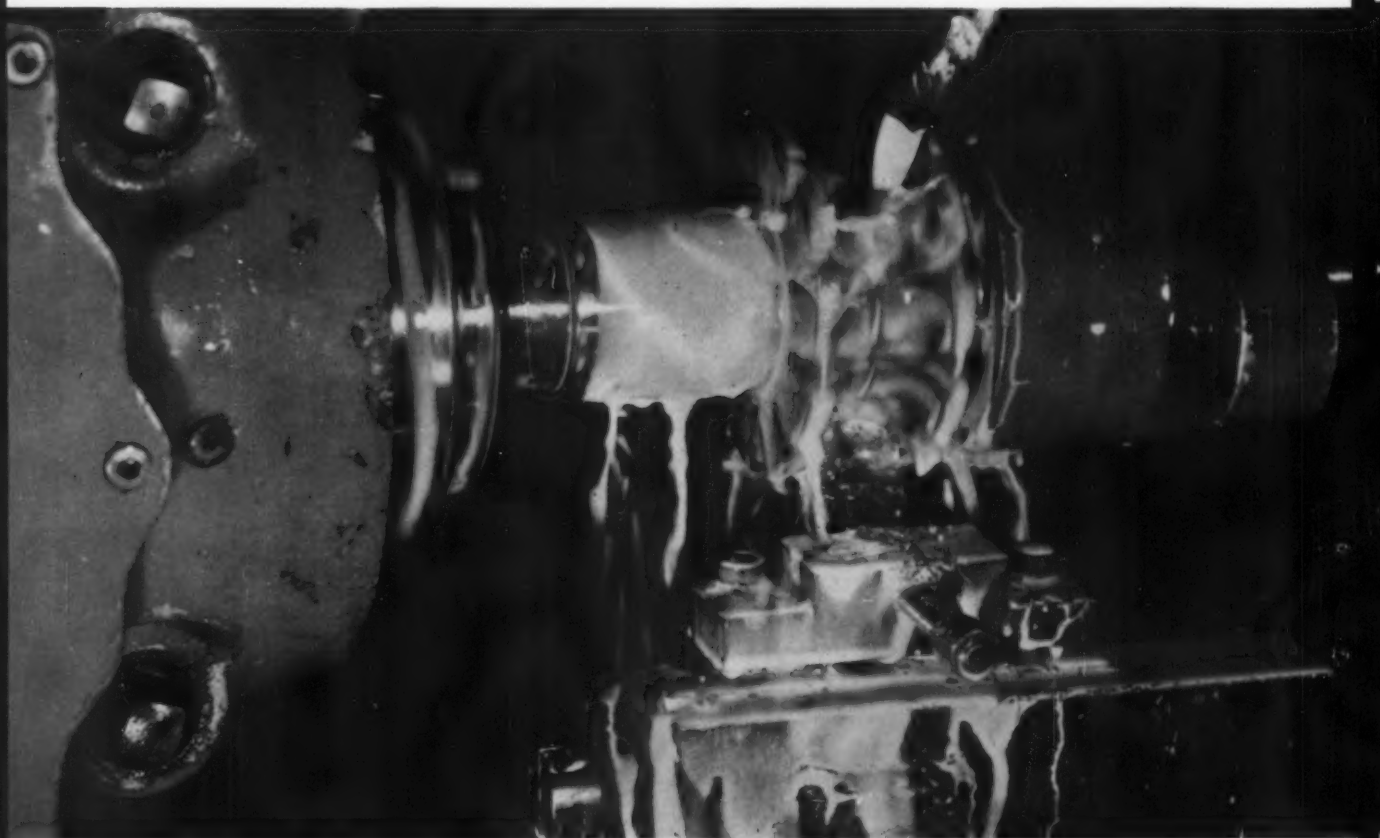


THE CLEVELAND CAP SCREW COMPANY 4444-1 Lee Road, Cleveland 28, Ohio

WAREHOUSES: Chicago • Philadelphia • New York • Los Angeles • San Francisco



Wheels and machines stay cleaner with emulsions of new S.E.C.O. Also, finishes are better.



Emulsions of new S.E.C.O. allow faster cuts with less tool wear.

*Photos courtesy of
Peter Salmon Co., Glenside, Pa.*

NEW EMULSIFYING OIL KEEPS MACHINES CLEAN, PROTECTS AGAINST RUST, GIVES IMPROVED HARD-WATER EMULSION STABILITY

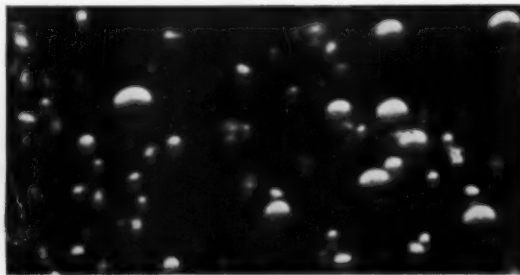
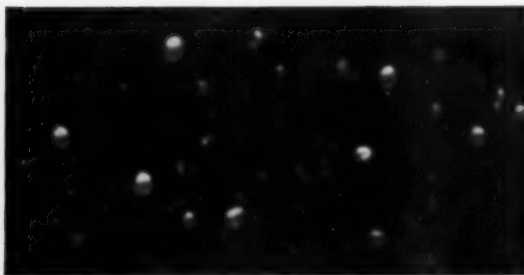
Emulsions of Sun's new S.E.C.O. (Sunoco® Emulsifying Cutting Oil) with smaller oil particle size give you the following benefits—

EMULSION STABILITY—In hard-water areas, impartial field tests show that emulsions of *new* S.E.C.O. stand up better under more severe conditions than those made with other regular emulsifying cutting oils.

DETERGENCY—The excellent wetting properties and detergency of *new* S.E.C.O. allow dirt and fines to settle quickly out of emulsions. Grinding wheels and machines stay cleaner.

RUST-PREVENTION—The smaller oil particle size in emulsions of *new* S.E.C.O. gives better metal wetting properties and increased protection against rust and corrosion. See photos below.

If you're a regular user of S.E.C.O., notice how much it has been improved. If you're not, find out what we mean about greater economy and improved production with *new* Sunoco Emulsifying Cutting Oil. Call your Sun representative, or write to Sun Oil Company, Philadelphia 3, Pa., Dept. I-9.



800x photomicrographs of 10% emulsions. *New* S.E.C.O. emulsion on left contains 8 times as many oil particles per unit volume as ordinary emulsion on right. Many minute particles in S.E.C.O. emulsion do not show at this magnification.



INDUSTRIAL PRODUCTS DEPARTMENT
SUN OIL COMPANY Philadelphia 3, Pa.

IN CANADA: SUN OIL COMPANY LIMITED, TORONTO AND MONTREAL

©Sun Oil Co., 1958

NOW! Get uniform strapping tension with Gerrard Torque Handle Model 62 Stretcher

Uniform strapping tension means—

- Safer, more dependable packaging
- Faster strapping
- Lower costs

IN THE USS* GERRARD Model 62 Stretcher, the tension setting and controlling device is built right into the handle. No guesswork. No tensioning "by feel." You just set the gauge indicator at the desired tension, and a loud click signals you when that degree of tension is reached. The Model 62 Stretcher is especially suited for large-sized loads, because it provides absolute *uniformity of tension* on each strap. Thus, no one strap is forced to carry more than its equal share of the stress. Of course, the stretcher offers maximum security for smaller shipments, too.

The Model 62 is but one of many versatile steel strapping tools made by USS GERRARD* to solve your packaging-tying problems. For more information, contact a USS GERRARD Sales Representative today.

— SEND FOR THIS FREE LITERATURE NOW! —

Gerrard Steel Strapping
4711 S. Richmond St., Chicago 32, Ill.

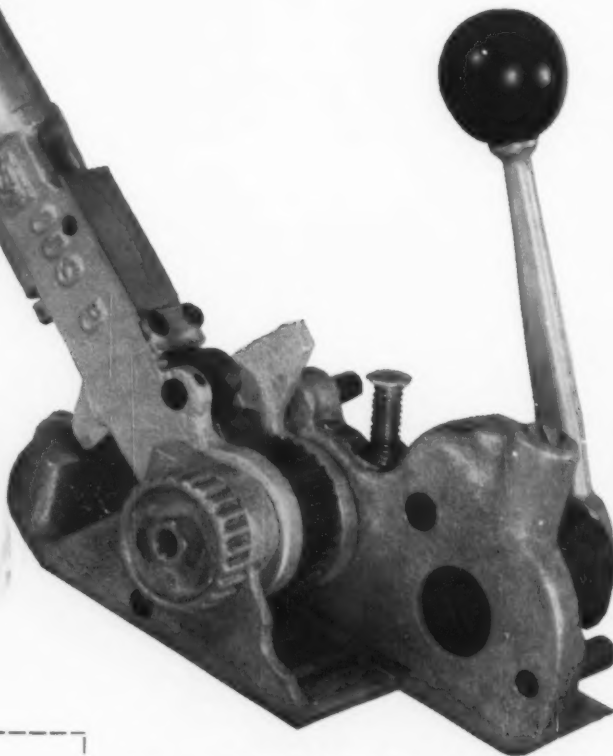
Without obligation, please send me the new 36-page
Gerrard Blue Book of Packaging.

Name

Company

Address

City State

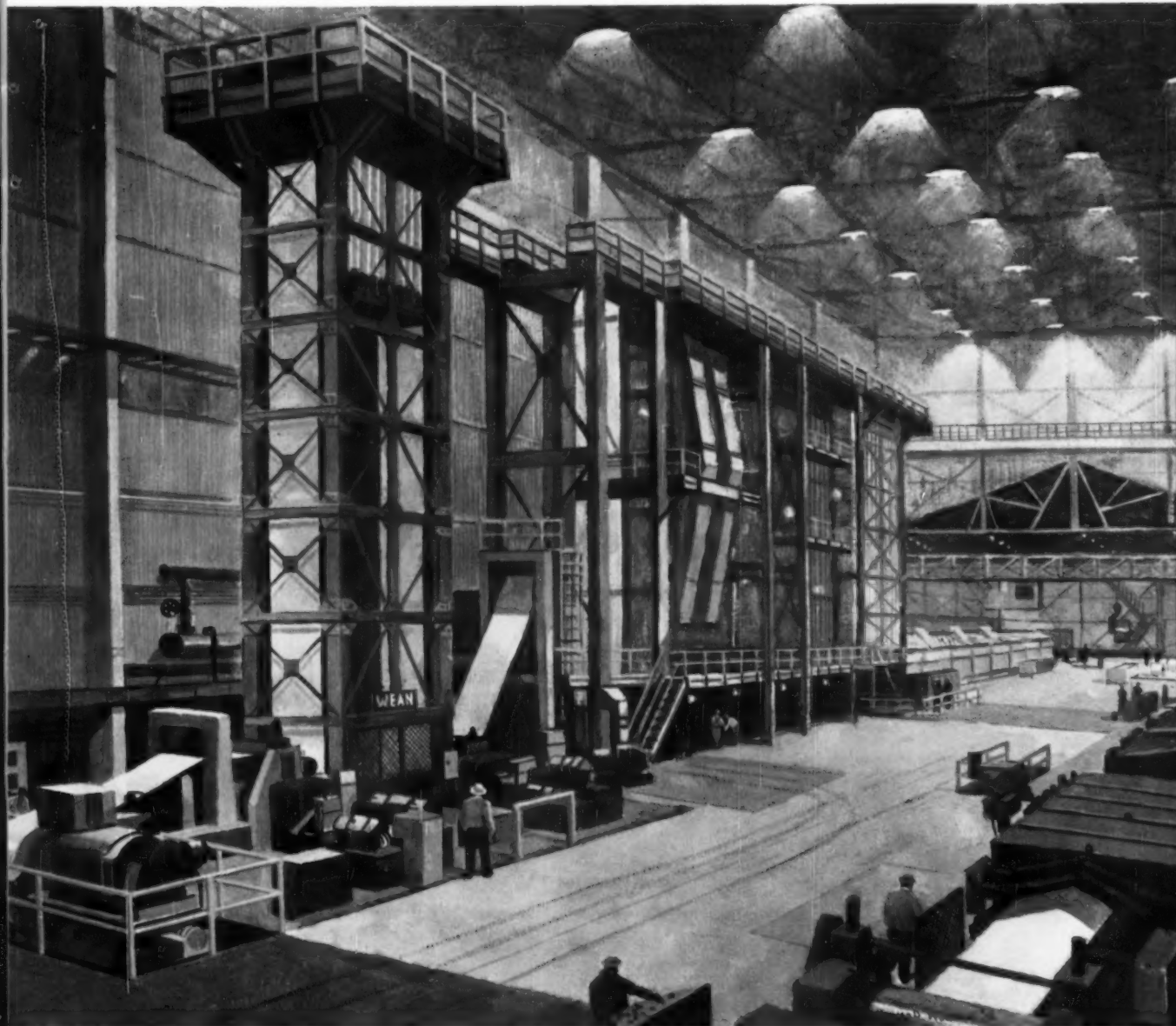


Gerrard Steel Strapping Dept.
U. S. Steel Supply
Division of
United States Steel



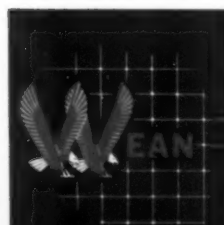
*TRADEMARK

Wean, "Youngstown" and Annealing...



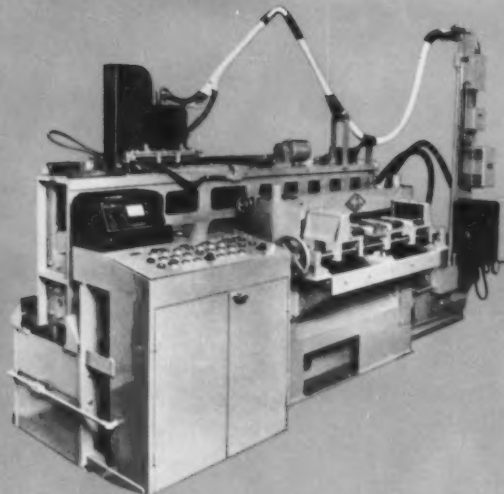
The dynamic steel industry has spearheaded our industrial growth by a continuing interest in tomorrow's progress as well as today's product. The continuous strip annealing process is typical of this constant search for better products and improved methods of making them. Long recognized as a pioneer in the development of the continuous line process, it was only natural that Wean was one of the leaders in the development of continuous strip annealing.

THE WEAN ENGINEERING COMPANY INC. • WARREN • OHIO



THE NEW

MPM Shear Welder



CONTINUOUS SILICON
SHEET PRODUCTION

Shearwelder for coil build up line for 42" wide
Silicon Steel from .015" to .030" thick.

*.....more automation
for even faster
Steel Production!*

● Metal Processing Machine Company's new Shearwelders are outstanding because of their advanced design incorporating automatically sequenced operations.

Shearing and welding are performed at the same station with positive clamping right at the work area, thereby insuring perfectly aligned butt welds.

"M.P.M." welds are **extremely ductile**, permitting subsequent rolling, forming, or blanking operations. Weld joints are smooth and require **no trimming**.

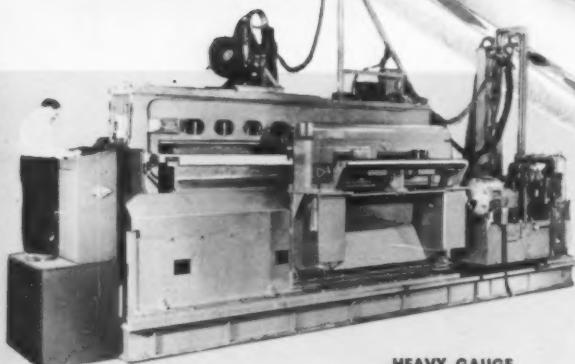
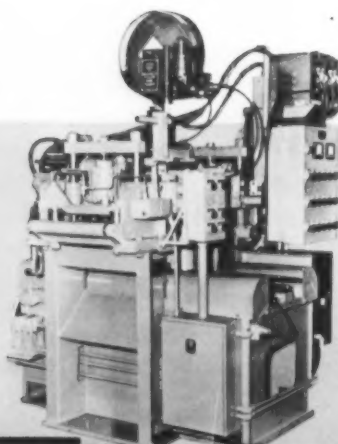
Rugged construction is insurance for minimum maintenance and compact design saves floor space.

THE METAL PROCESSING MACHINE CO.
SUBSIDIARY OF THE MCKAY MACHINE CO.
YOUNGSTOWN, OHIO



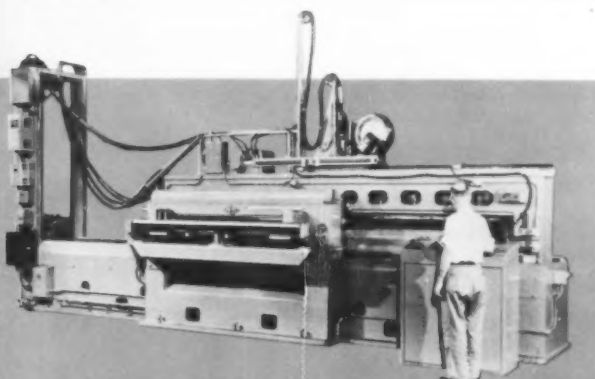
CONTINUOUS TUBE
MILL PRODUCTION

Shearwelder used with
strip looping device for
splicing coil to coil to
permit continuous pro-
duction of tube mill.



HEAVY GAUGE
STAINLESS PRODUCTION

Shearwelder for butt welding 60" wide x .250" thick
Stainless Steel.



MAJOR COIL BUILD UP

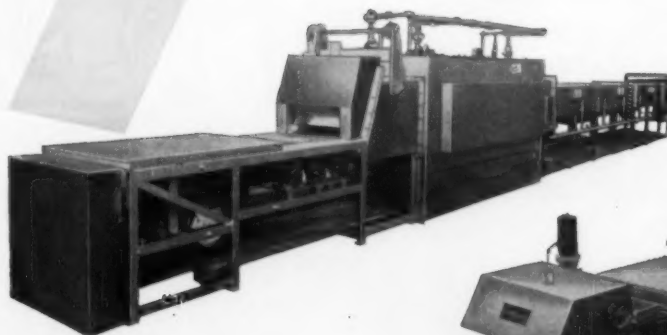
Shearwelder for Carbon Steel coil build up line for
.015" to .060" thick x 72" maximum width.

Look to Lindberg for sintering furnaces



Hand Pusher Batch Type Furnace

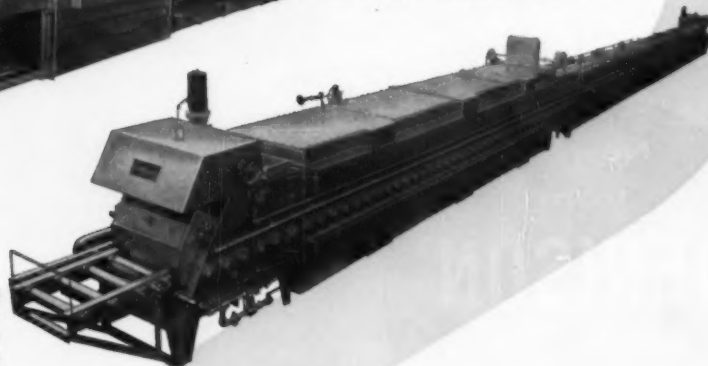
For small production lots and experimental sintering. An all-purpose unit for operation from 1300° F. to 2500° F. Made in various sizes for sintering from 25 to 300 pounds per hour.



Mesh Belt

Continuous Type Furnace

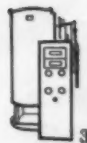
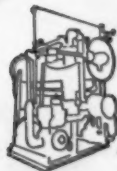
Sintering furnace for small light parts in copper, bronze, brass or steel. Temperature range from 1300° F. to 2100° F. Provides low temperature silver brazing, bright annealing, as well as sintering of powder metals. Production ranges up to 500 pounds per hour.



Roller Hearth Continuous Type Furnace

Designed to handle loads up to 2200 pounds per hour. Effective temperature range from 1300° F. to 2100° F. For bright annealing, low temperature silver brazing as well as sintering of powder metals.

For sintering furnaces, just as in all types of industrial heating equipment, you can depend on Lindberg's ability to supply exactly the right equipment for your needs. Just get in touch with your nearest Lindberg Field Representative, or write Lindberg Engineering Company, 2452 West Hubbard Street, Chicago 12, Illinois. Los Angeles Plant: 11937 South Regentview Avenue, at Downey, California.



Lindberg atmosphere generators provide the proper atmospheres recommended for use with Lindberg Sintering Furnaces. These are: 1. HYEX Generator... approximately 4% carbon dioxide—18% hydrogen—12% carbon monoxide and 66% nitrogen. 2. HYEN Generator... neutral atmosphere approximately 21% carbon monoxide—40% hydrogen—38% nitrogen and 1% methane. 3. HYAM Generator... composed of approximately 75% hydrogen and 25% nitrogen.

See Lindberg in Booth No. 12, Metal Powder Show in Philadelphia

LINDBERG heat for industry



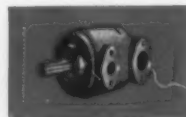
Newest
from
DENISON
Booth 1012
ASTE
Show

CREATIVE

**Latest cost reduction
ideas to put you ahead
of competition**

HERE'S WHAT YOU'LL SEE

- Complete displays of the newest, advanced developments in hydraulic pumps...motors... and controls for continuous service up to 5000 psi.





HYDRAULICS

• Demonstrations of the unique, versatile one-ton and two-ton Denison hydraulic Multipress... for manual, semi-automatic or fully automated production.

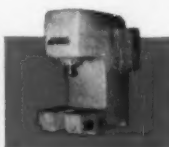
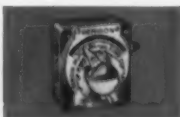
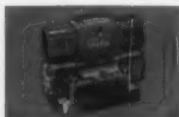
• Talk with Denison Hydraulic Specialists... on hand to help you with any tooling, production or machine design problem in your plant.

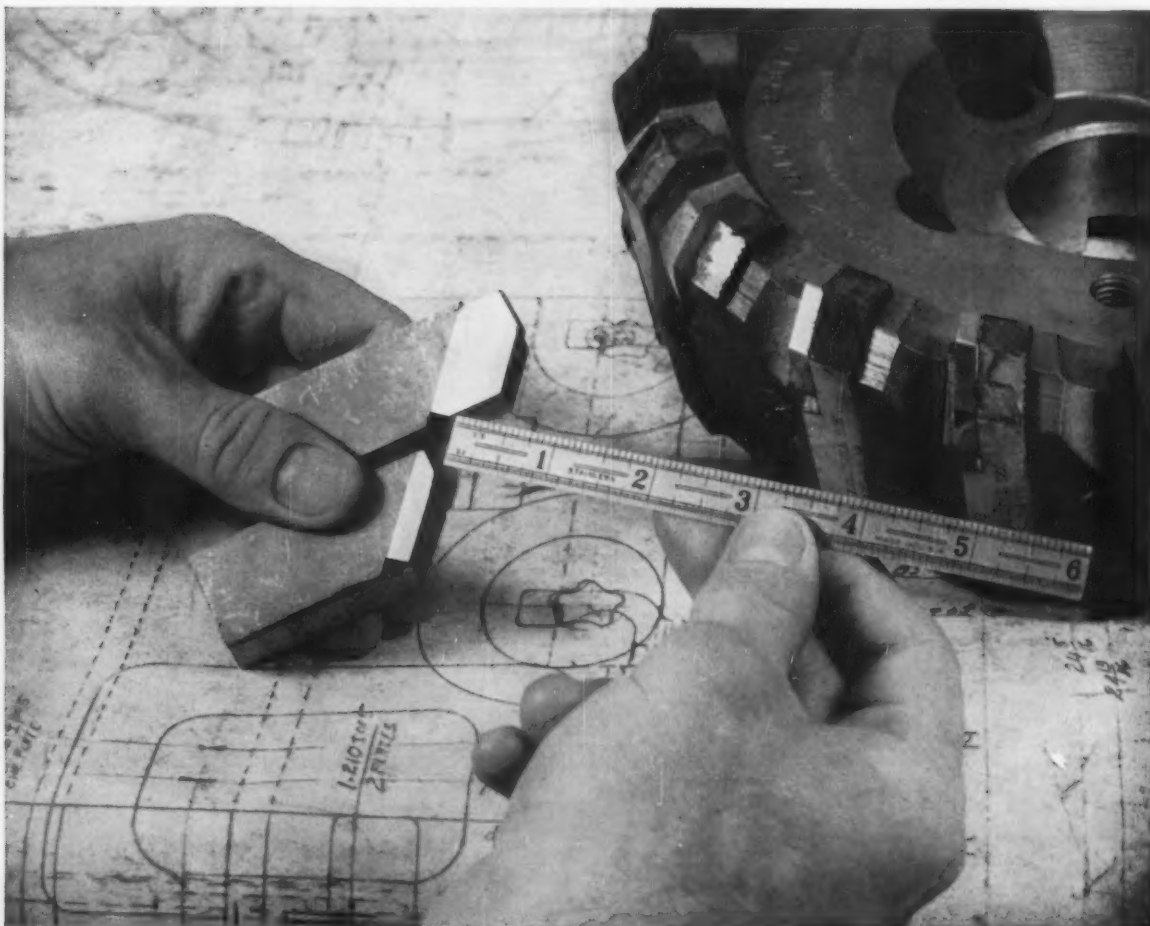
DENISON ENGINEERING DIVISION

American Brake Shoe Co.
1242 Dublin Road • Columbus 16, Ohio

HYDRAULIC PRESSES • PUMPS • MOTORS • CONTROLS

Denison, Denison HydrOILics and Multipress are registered trademarks of Denison Eng. Div., ARSCO





Ingersoll Heavy-Duty Shear Clear Face Mill designed for cast iron or steel. Size of bevel is varied to suit depth of stock.

What Does Your Scrap Barrel Show?

Do you get over $\frac{1}{2}$ " of blade wear? A look into your scrap barrel will show that many blades were wasted because of cracks, misuse, improper design or misapplication of the cutter and grade of carbide. You probably can't tell why these blades failed prematurely because so many variables are involved.

We are used to working with these variables and can help you reduce your tool costs. Part of our product is the continuous counsel of your Ingersoll representative and our cutter engineers. They will consider the machine, material, speed, feed and finish requirements before recommending the tool which will do the best job at the lowest cost.

We will welcome an opportunity to tell you more about this service. Write:



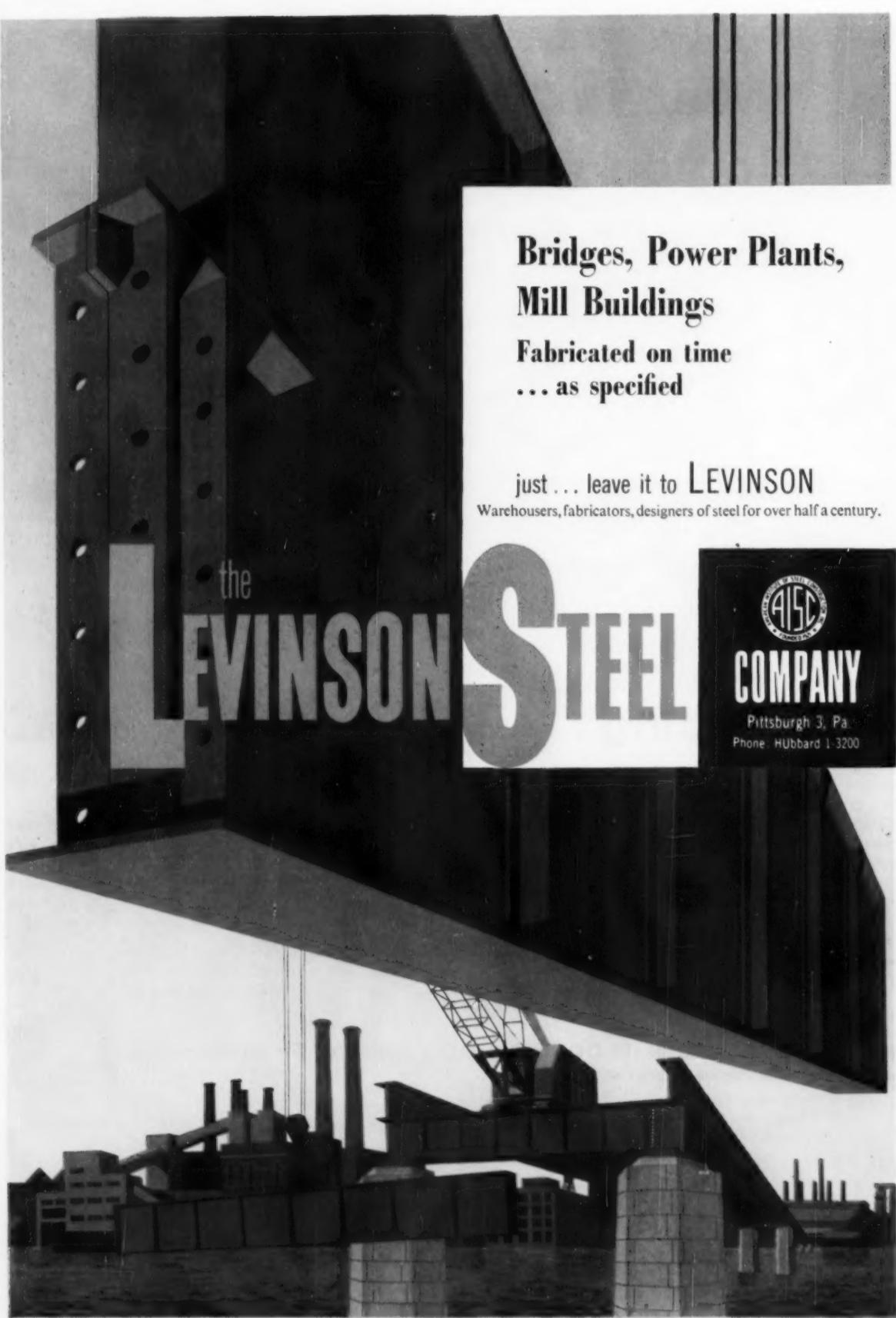
If you do not have a copy of this book, write us and we will send you one. It describes in detail the complete line of Ingersoll inserted blade milling and boring tools. Ask for Catalog #66N

CUTTER DIVISION

THE INGERSOLL MILLING MACHINE COMPANY

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**Bridges, Power Plants,
Mill Buildings**

**Fabricated on time
... as specified**

just ... leave it to **LEVINSON**

Warehousers, fabricators, designers of steel for over half a century.

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Phone HUbbard 1-3200

Which of these qualities do you want to add to your product?

- ☐ Beauty with outstanding colors
- ☐ Controlled sheen—high gloss to satin finish
- ☐ Durable finish—retains gloss and color
- ☐ Smooth finishes—unmarred by sags, drip marks or bridging at intersections
- ☐ Resistance to salt spray, water and sunlight
- ☐ Toughness, impact and abrasion resistance
- ☐ Uniformity and good adhesion of finish
- ☐ Electrical and thermal insulation
- ☐ Completely uniform coverage—including sharp edges, corners or projections

announcing . . . **NEW CORVEL*** Fusion Bond Finishes

CORVEL Cellulosic Finishing Powders open up new product possibilities for you. Castings, steel wire parts, stampings, etc. can now be clad uniformly with cellulose in just one dip, with thicknesses that can far exceed those obtainable with conventional finishes. You get a premium appearance with improved durability, and costly machining or preparation of substrate surfaces is often eliminated. CORVEL resins are especially prepared for use with the WHIRLCLAD® Finishing Process.

CORVEL Finishes are applied by dipping the heated object into a fluidized bed of dry CORVEL powders. The powders bond by fusion to the surface of the part. The finishing powders are in a state of "whirling suspension", and the bed of dry powders assumes penetrating flow characteristics much like a liquid.

Get complete details now! Write for our bulletin on CORVEL Finishing Resins including Cellulose, Nylon, Polyethylene, K-51 (Chlorinated Polyethers) and others.

NATIONAL POLYMER PRODUCTS, INC./Reading, Pennsylvania
A subsidiary of The Polymer Corporation

*Polymer Corporation Trademark for finishing materials



CORVEL Fusion Bond Finishes are resin powders of various types specially formulated for use with the WHIRLCLAD Finishing Process. This new production process for cladding metals and other materials with plastics is exclusively licensed in the U.S. and Canada by Polymer Processes, Inc., an affiliate company.

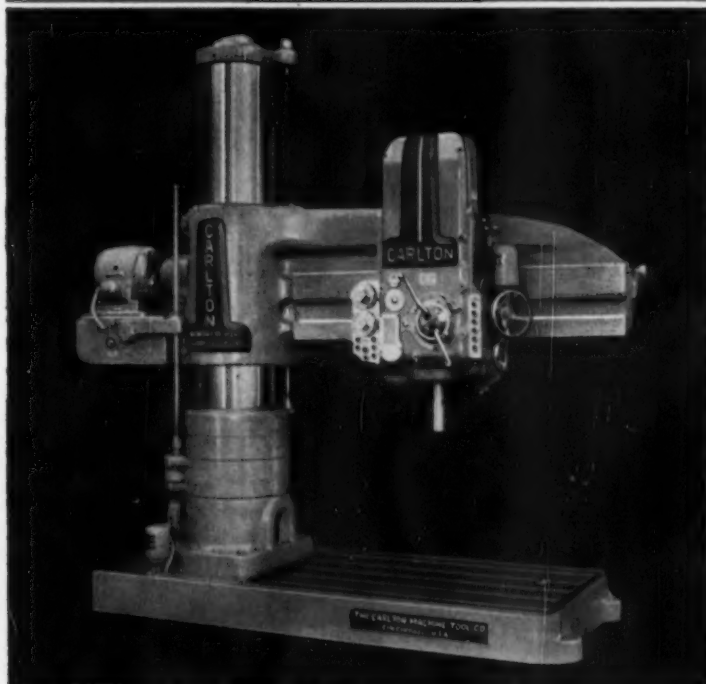
| Model | Column diameters | Arm lengths | Speeds | | Feeds | | Motor recommended |
|-------|-------------------|-------------------------------|--------|----------|-------|------------|-------------------------|
| | | | No. | Range | No. | Range | |
| 0A | 9" | 3'-4' | 9 | 20 to 1 | 4 | .006-.020 | 3-hp |
| 1A | 9" 11" | 3'-4' 3'-4'-5' | 12 | 25 to 1 | 6 | .006-.025 | 5-hp 5 or 7½-hp |
| 3A | 13" 15" 17" | 4'-5' 4'-5'-6' 5'-8'-7' | 36 | 100 to 1 | 18 | .004-.125* | 7½, 10, 15, 20 or 25-hp |
| 4A | 19" | 6'-7'-8' | 36 | 100 to 1 | 18 | .004-.125* | 15 to 40-hp |
| 5A | 22" 26" | 7' to 10' 8' to 12' | 36 | 100 to 1 | 18 | .004-.125* | 20 to 40-hp† |

*8, 11½, 14 and 18 threads per inch are standard, with various other combinations available.

†Driving motor larger than 40 hp can be used if desired.

Carlton...the modern design radial drill

0A 1A 3A 4A 5A



Only at Carlton can you take your choice of

- 5 different models of radial drills
- Column diameters from 9" to 26"; arm lengths from 3-ft. to 12-ft.
- 5 different types of speed-feed controls (3A, 4A and 5A models)

For the utmost in versatility, you can choose the Carlton Programming System that lets you pre-set speeds and feeds for a complete drilling sequence of 20 or more operations.

For production operations involving fewer and less complex drilling sequences you can select from among three speed-feed controls that help make the machine more productive: Pre-select, Power range Pre-select and Partial Pre-select.

And in manual control, Carlton's simplified pushbutton control head is the most modern in design and easiest to operate.

There's no compromising at Carlton... where you select the radial drill that fits your requirements exactly. Write today for bulletins describing the sizes you need. The Carlton Machine Tool Co., Cincinnati 25, Ohio.

Carlton

Specialists in radial drills

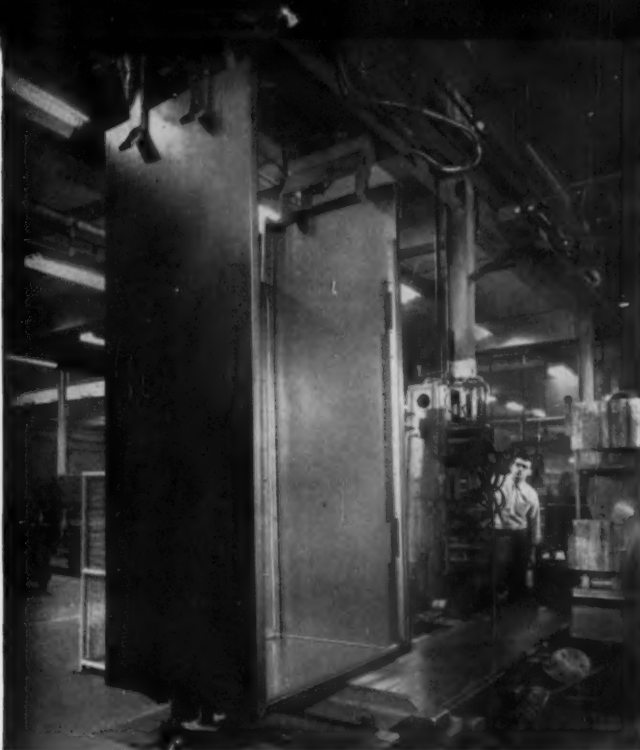


PITTSBURGH STEEL'S cold-rolled sheet passes critical surface inspection as . . .

The 3 F's in Pittsburgh Steel's Sheets Keep Automated Lines Rolling at Westinghouse

STEEL that is free of flaws is vital to the gleaming painted surface of finished refrigerator.





COMPLETELY FORMED by automated equipment, refrigerator's shell then moves to welding operation.



3 F's—Flatness, Finish, Formability—show up here as outer shells await painting.

"If we made 75 a day then, we were really going. Now, we're geared up here to make more than twice that in an hour."

That quote came from a veteran production man at Westinghouse Electric's huge and humming Appliance Division plant near Columbus, Ohio.

The difference between daily production of 75 refrigerators (in 1927) and today's rate is explained by just one word—automation.

Production of the refrigerator's steel shell is automated completely through welding. This includes some 15 distinct operations required to convert smooth, precisely dimensioned cold rolled sheet steel into the outer shell of a home refrigerator.

Part of Westinghouse's ability to use advanced production methods is due to the steel available from suppliers like Pittsburgh Steel Company.

H. L. Johnson, the plant's purchasing agent, and Joseph A. Scattoloni, staff supervisor of manufacturing engineering, agree that automation places special responsibilities on their steel suppliers. As Mr. Scattoloni puts it:

"Westinghouse built its reputation on quality products, but we can't build quality when it isn't in the materials to start with."

Pittsburgh Steel knows—even without automation to consider—that sheet going into appliances must have the Three F's—Flatness, Finish and Formability. Add requirements of automation and you need

these same qualities, but more so. Here's why they're so vital.

• **Dimensional accuracy**—A variation of as little as .005 inch could compound into a total error large enough to interrupt production, scrap a shell or both.

To produce a shell, automatic equipment has to make six 90-degree bends, as well as a smaller seventh one. If the sheet isn't flat or if it lacks uniform temper, bends can be thrown off.

Once bends are made, the sheets can't be allowed to spring back. Over-bending, too, will scrap a shell. That gets costly when you consider that the shell—at about 94 pounds—is the largest single item in the 140-150 pounds of steel per finished refrigerator.

If the sheet isn't flat, waviness will show up glaringly in the finished shell, or it could cause an "oil-canning" effect. This poses a threat to the painted surface.

If camber isn't within specific limits, sheets can't be held properly during blanking and punching. Holes

creep beyond tolerances, ultimately scrapping the shell.

• **Surface finish**—Since the shell must take a uniform and critical painting, surface finish is all-important.

Rust, scale, piping, pits—singly, or in combination—can ruin a shell, so Pittsburgh Steel knows why flaw-free steel is a must.

• **Formability**—Another name for shapeliness—is more vital in automatic forming than in a hand operation. And strain marks resulting from improperly bent sheet will require either complete scrapping or correction by expensive hand machine methods.

Westinghouse stakes its reputation on quality of its products. A supplier who can provide Westinghouse with this quality can meet your needs, too. The full range of hot-and-cold rolled sheet and strip, produced exactly on the steel industry's finest mill equipment—is as close as your telephone. Call any of the Pittsburgh Steel Company district sales offices listed here. Do it today!

Pittsburgh Steel Company

Grant Building

Pittsburgh 30, Pa.



District Sales Offices

Atlanta
Chicago

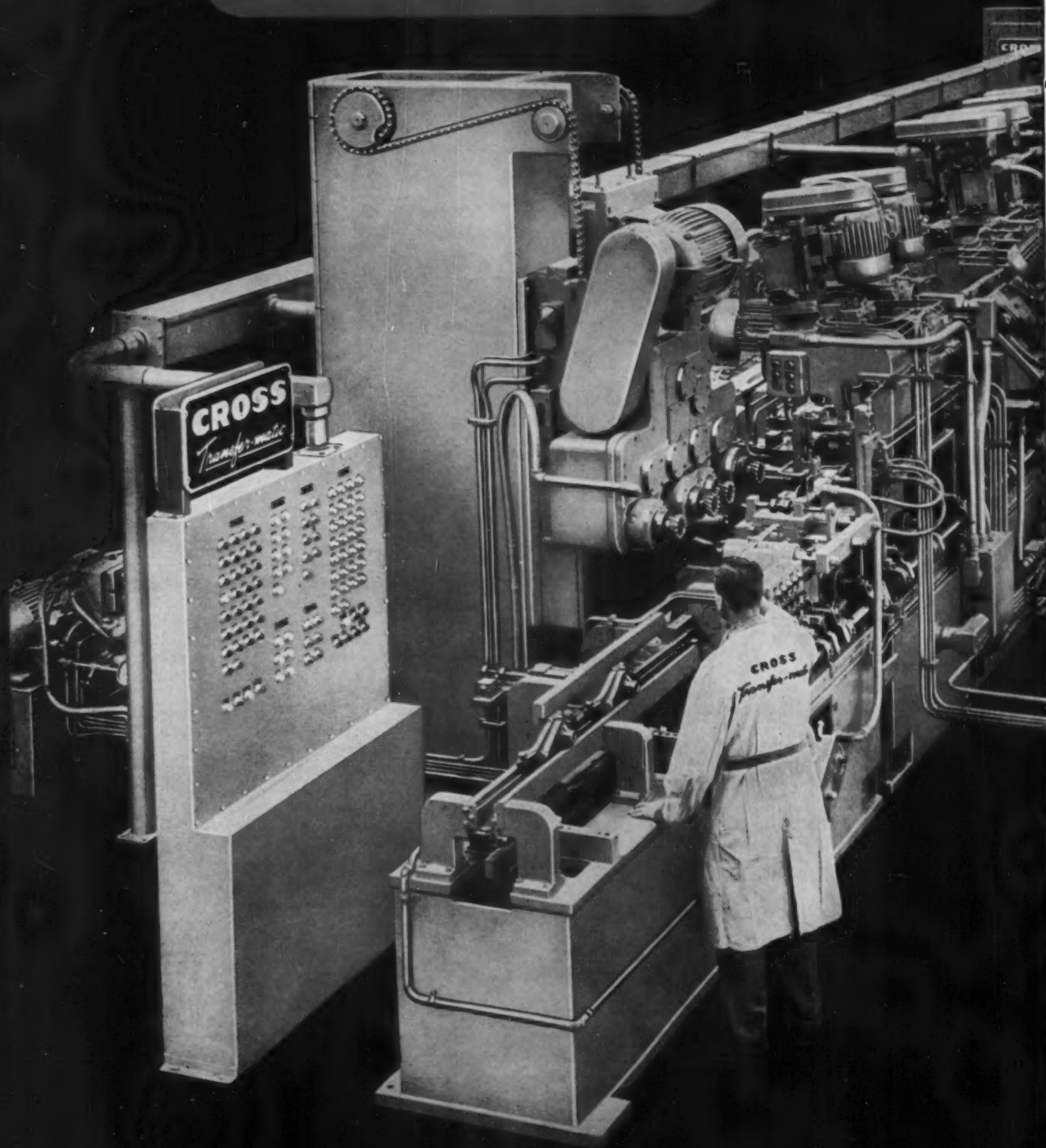
Cleveland
Dallas

Dayton
Detroit
Houston

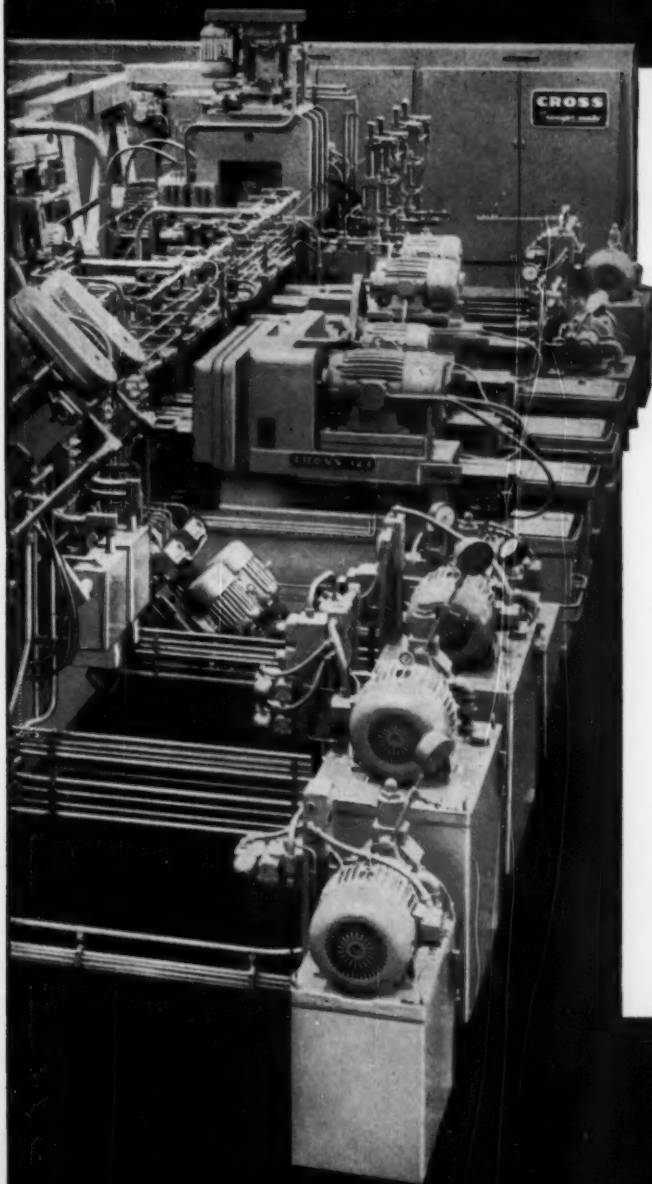
Los Angeles
New York
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Pittsburgh
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Warren, Ohio

Complete Machining of Water Pump Bodies



Another Transfer-matic by Cross

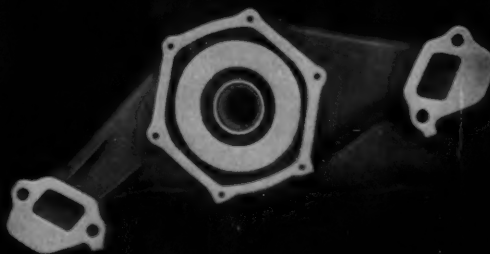


- ★ Machines two castings simultaneously at rated capacity of 200 pieces per hour.
- ★ Station 1 load; Station 2 mills mounting faces; Station 3 drills thermostat by-pass hole, mainshaft hole and four mounting holes; Station 4 cross-faces cover face and drills one angular vent hole; Station 5 chamfers thermostat by-pass hole, drills six cover holes, spot-faces mainshaft hole on inside; Station 6 cross-faces impeller face, reams thermostat by-pass hole and drills second angular vent hole; Station 7 spotfaces and chamfers mainshaft hole, spotfaces four mounting holes and drills by-pass hole on inside; Station 8 finish cross-faces impeller face and recesses center of mainshaft hole; Station 9 semi-finish bores mainshaft hole; Station 10 finish precision bores mainshaft hole; Station 11 tap drills heater connection hole and probes cover holes; Station 12 taps heater connection hole and six cover holes; Station 13 automatically unloads two pump bodies.
- ★ Locating: in Station 2, parts are located from foundry pads; in Station 3, from milled faces and cored water passages; and, from Station 4 on, from milled faces and two mounting holes.
- ★ Cross' "building block" principle provides flexibility for future part design changes.
- ★ Other features include: complete interchangeability of all standard and special parts for easy maintenance, construction to JIC Standards, hardened and ground ways and automatic lubrication.

Established 1898

THE **CROSS** CO.
First in Automation

PARK GROVE STATION • DETROIT 5, MICHIGAN



How Fred Lee



Stan Bozek, Abrasive and Methods Engineer at Marlin-Rockwell Corp., Plainville, Conn., discusses new form grinding technique for ball bearing races with Fred Lee, Manager of Bay State's district office in Bristol, Conn.

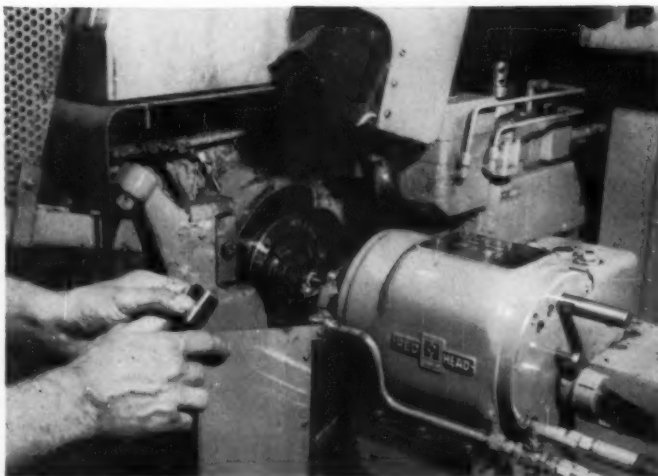
helped revolutionize the grinding of bearing races

Ball bearings used in missile guidance systems and other highly critical applications have to have super-accurate races . . . but cost is vitally important, too. That's why Marlin-Rockwell Corp., of Plainville, Conn., was one of the first bearing manufacturers to switch from the oscillating rubber wheel grinding technique to form grinding.

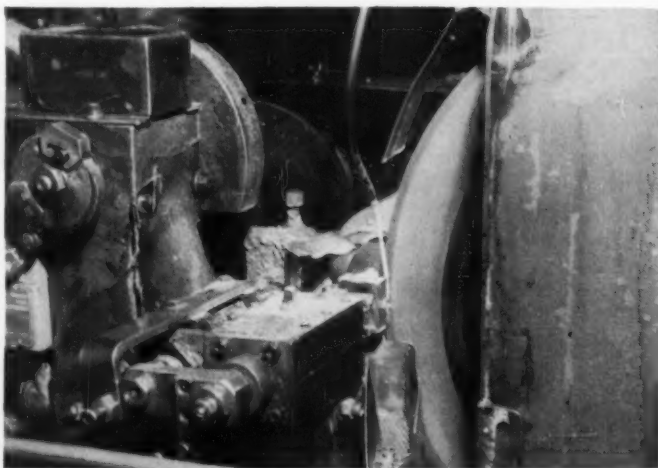
Bay State's Fred Lee, recognized as one of the country's leading authorities on bearing grinding, was called in to discuss the problem with Marlin-Rockwell engineers. After exhaustive study, he specified semi-friable, fine grit, medium grade vitrified wheels that varied in size from $\frac{1}{2}$ " to 20" diameter.

Result: 50% closer confinement of race curvature, 100% improvement in roundness and consistent uniformity in multiple production runs. General foreman John Gworek, veteran of 30 years of precision bearing grinding, says flatly: "It's the *only* way to grind them."

Like Fred Lee, your own Bay State representative may be best known as an expert in a particular type of grinding but his general knowledge of grinding techniques is both wide and deep. **Better grinding at lower cost . . . that is his business.**



Form grinding 2 ball races at the same time on water pump bearings with Bay State vitrified wheel, diamond dressed only every sixth piece, on Heald 1701 Form Grinder.



Rough form grinding O.D. contour of inner races with 20" diam. Bay State vitrified wheel (Crush formed) on Cincinnati Microcentric Grinder.



BAY STATE ABRASIVES

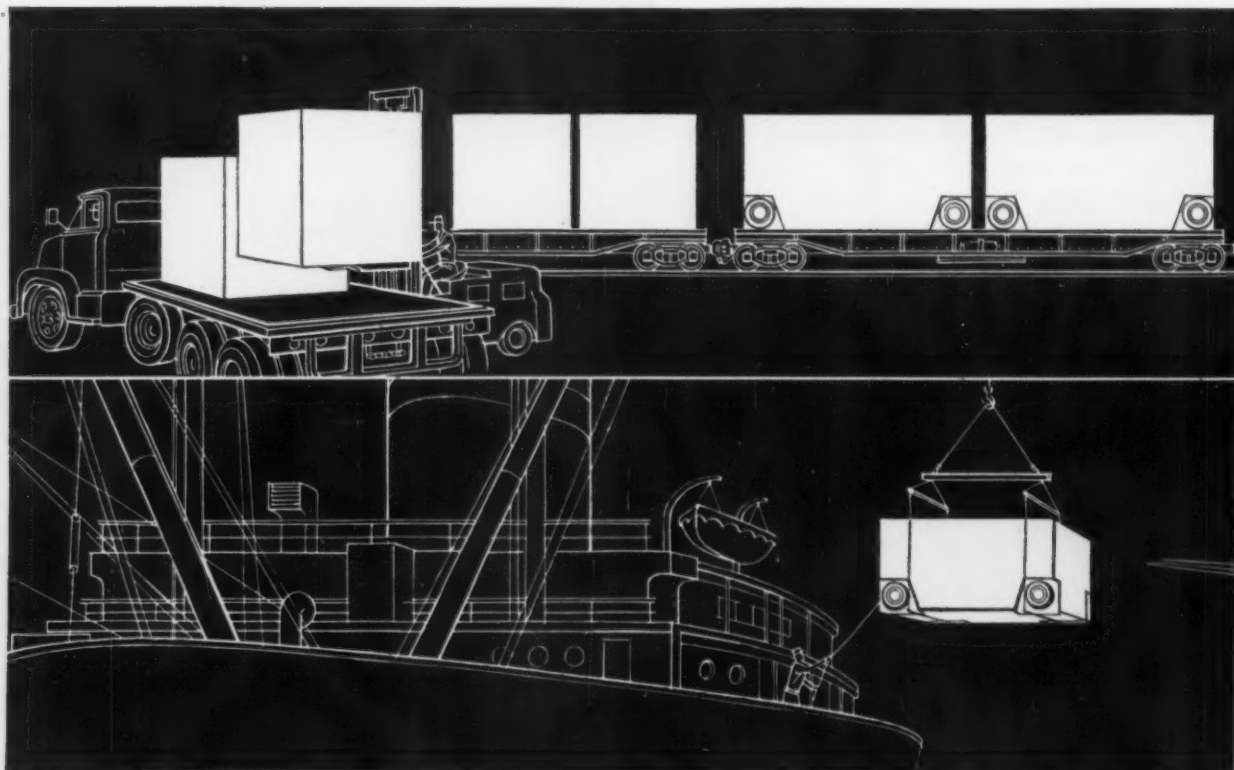
Bay State Abrasive Products Co., Westboro, Massachusetts.

In Canada: Bay State Abrasive Products Co., (Canada) Ltd., Brantford, Ontario.

Branch Offices: Bristol, Conn., Chicago, Cleveland, Detroit, Pittsburgh. Distributors: All principal cities.

For whatever you *will* make . . .

N-A-X[®] HIGH-STRENGTH STEELS PROVIDE STRENGTH WITH LIGHT WEIGHT



Transportation today stands on the threshold of a major breakthrough . . . in the new direction of reduced handling for faster, easier distribution.

Piggyback is here to stay, so is "fishyback" and "birdyback." Sturdy, versatile steel containers move quickly and economically from flatcar to trailer—from ship to shore—even from ground to air.

Already N-A-X HIGH-STRENGTH steels are playing a leading role in this modern transportation trend. By providing the extra strength and corrosion resistance to assure long container life, plus light weight for economical handling and shipping, N-A-X HIGH-STRENGTH steels continue to accelerate transportation progress.

Check These Important Advantages for Your Job:

N-A-X HIGH-STRENGTH steels—both N-A-X HIGH-TENSILE and N-A-X FINEGRAIN—compared with carbon steel, are 50% stronger • have high fatigue life with great toughness • are cold formed readily into difficult stampings • are stable against aging • have greater resistance to abrasion • are readily welded by any process • offer greater paint adhesion • polish to a high luster at minimum cost.

Although N-A-X FINEGRAIN's resistance to normal atmospheric corrosion is twice that of carbon steel, N-A-X HIGH-TENSILE is recommended where resistance to extreme atmospheric corrosion is important.

For whatever you make, from steel boxes to box-cars, with N-A-X HIGH-STRENGTH steels you can design longer life, and/or less weight, and economy into your products. Let us show you how.

N-A-X Alloy Sales Div., Dept. A-7

Great Lakes Steel Corp., Detroit 29, Michigan

- ☐ Please send me 12-page illustrated technical catalog on N-A-X HIGH-STRENGTH steels.
- ☐ Please have your representative contact me.

Name _____ Title _____

Company _____

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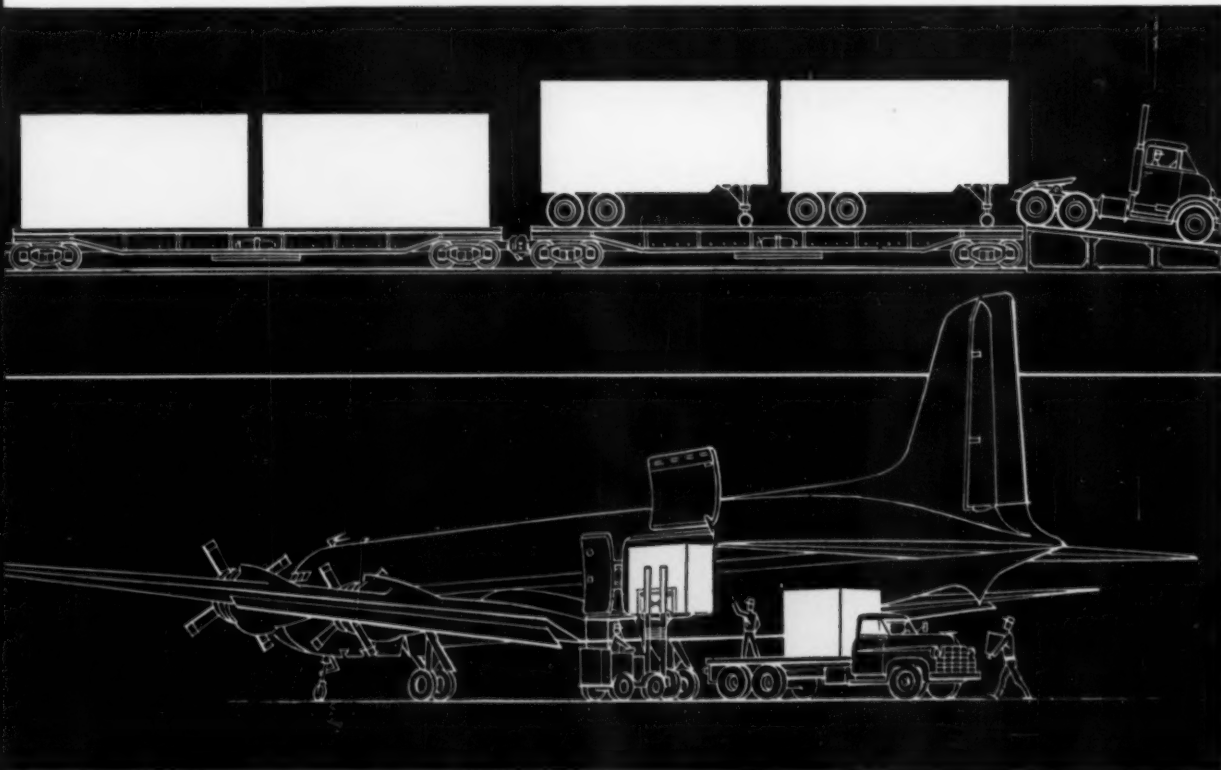


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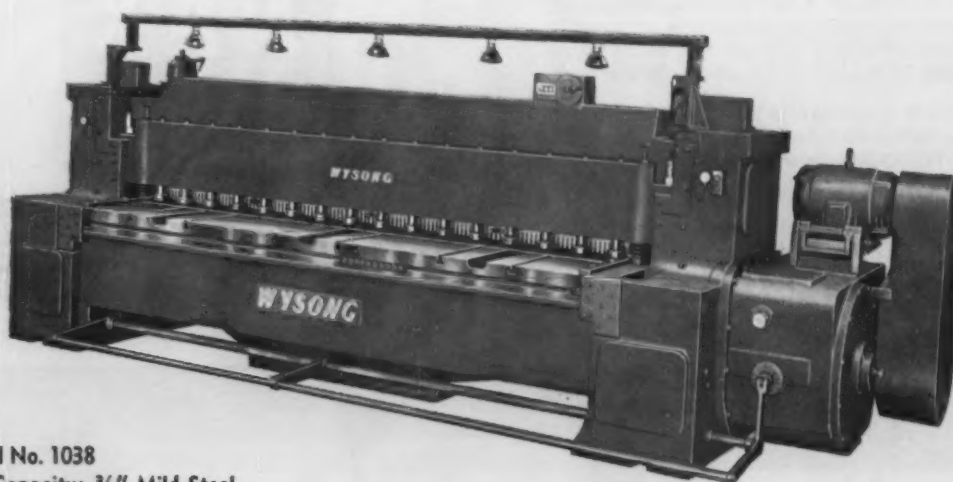
GREAT LAKES STEEL CORPORATION

Detroit 29, Michigan • Division of

NATIONAL STEEL CORPORATION



now Wysong
shears are
nodulized *



Model No. 1038
Capacity: $\frac{3}{8}$ " Mild Steel
Cutting length, 10 ft.



Essential parts such as knife bars, tables and beds are constructed from Nodular (Ductile) Iron Castings with a tensile strength of approximately 90,000 lbs. per square inch. This assures greater strength and rigidity to virtually eliminate deflection. As a result you can be sure of unsurpassed accuracy, longer maintenance of

alignment and longer machine life. Compare the quality of materials, the design and workmanship of a Wysong Shear with any other shear on the market. You'll find lots of reasons to ... buy a WYSONG, it's Miles AHEAD!

WYSONG

WYSONG & MILES GREENSBORO NORTH CAROLINA



Specialties of the House

ROEBLING is a specialist in galvanizing, with practically unmatched facilities for producing galvanized wire in enormous quantities and in complete size ranges. Hot galvanized is available in sizes from .283" to .035" . . . Roegal (drawn galvanized) from .187" to .005".

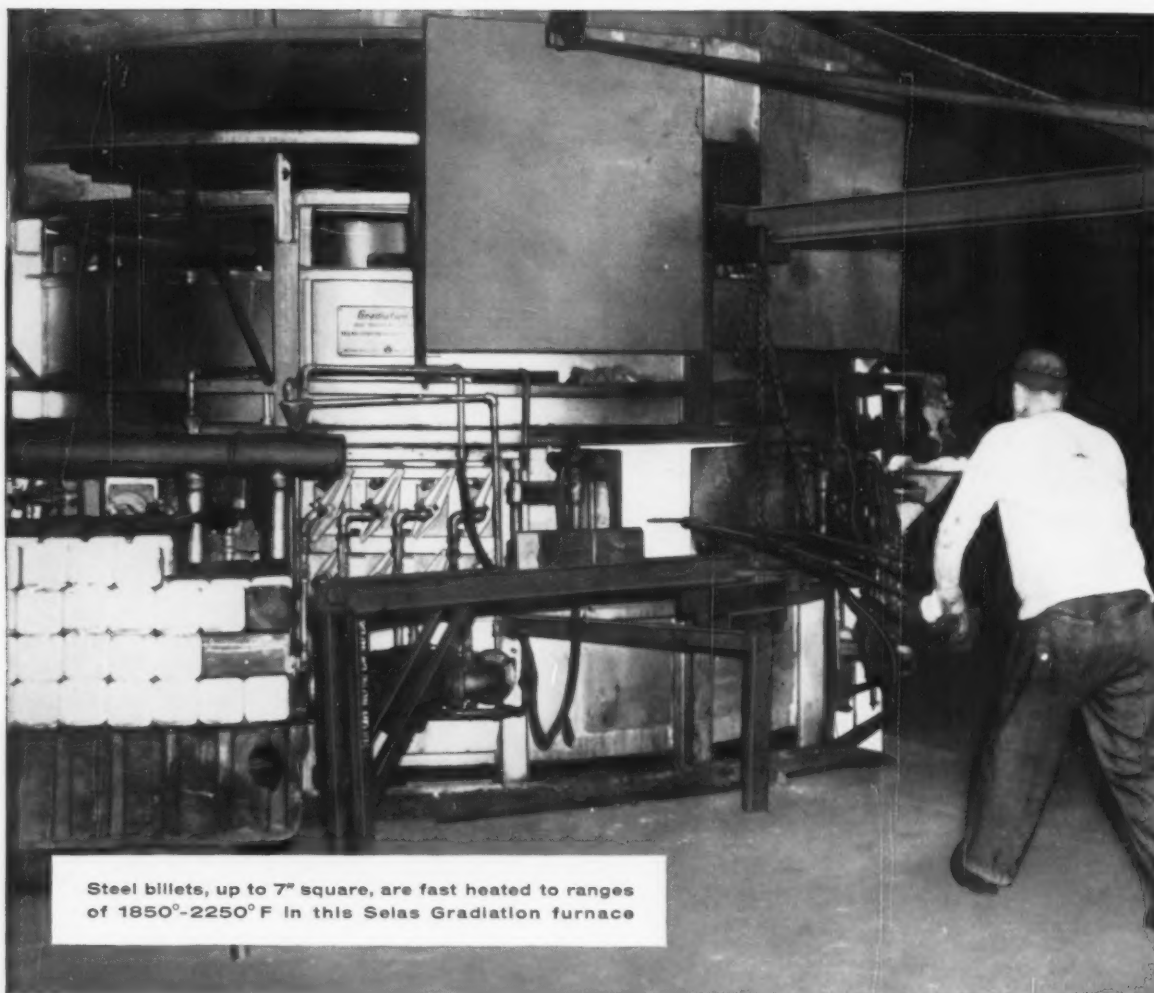
You pay for the best when you buy galvanized wire. Make sure you get it—specify Roebing! Write Wire and Cold Rolled Steel Products Division, John A. Roebing's Sons Corporation, Trenton 2, N. J.

ROEBLING

Branch Offices in Principal Cities
Subsidiary of The Colorado Fuel and Iron Corporation



Roebing...Your Product is Better for it



Steel billets, up to 7" square, are fast heated to ranges of 1850°-2250° F in this Selas Gradation furnace

FAST HEATING WITH *GAS*

- improves forgeability
- reduces power requirements
- increases metal flow

A Gas-fired Gradation® furnace designed and built by Selas Corporation for Lansdowne Steel and Iron Company, Morton, Pennsylvania heats billets to 1850°-2250° F at rates of 2 to 5 minutes per inch of thickness—thus virtually eliminating scale. Some fast heated billets are forged at temperatures 300° F below conventional methods.

Improved forgeability, directly attributable to fast heating with Gas, reduces power requirements

at the usual forging temperatures. Or, for given power applied, permits an increase in the amount of flow or deformation.

For information on how Gas equipment can help you in your production operations, call your Gas Company's industrial specialist. He'll be glad to discuss the economies and outstanding results you get with Gas and modern Gas equipment. *American Gas Association.*

UNITED[®] ALUMINUM FOIL MILL



DESIGNED AND BUILT BY

UNITED

ENGINEERING AND FOUNDRY COMPANY
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Designers and Builders of Ferrous and Nonferrous Rolling Mills, Mill Rolls, Auxiliary Mill and Processing Equipment, Presses and other heavy machinery. Manufacturers of Iron, Nodular Iron and Steel Castings and Weldments.



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And Still Another Use for SIL-FOS!

Handy & Harman Brazing Alloy Used in Diamond Tool Manufacture

This dramatic application of SIL-Fos clearly points out that, among this alloy's many qualities, its *versatility* is remarkable.

The A. I. T. Diamond Tool Company, Skokie, Illinois, uses SIL-Fos in powder form in the manufacture of its Al-Aloid diamond grinding wheel. The powdered SIL-Fos is mixed with the diamond dust and then sintered to form a wheel that in grinding "... holds sharp edges, does not heat or check carbides, lengthens life of carbide tools and does the work of four to six resin-bonded wheels."

SIL-Fos is one in a large family of Handy & Harman brazing alloys. It is a low-temperature alloy and is

available in two analyses: SIL-Fos and SIL-Fos 5. These are silver-copper-phosphorus alloy systems; one contains 15% silver, the other 5%. Both have a wide melting range, starting to flow at 1185°F. and fully free flowing at 1300°F. Their "benefit categories" include: *joint strength, leaktightness, ductility, electrical conductivity, heat transfer, corrosion resistance, fast production and economy.* All of these qualities apply to joining a wide range of nonferrous metals, *as well as diamonds.*

There are many truly remarkable case histories of SIL-Fos brazing. We'd like very much to tell you about them and give you further details on what can be done for your product.

Your NO. **1** Source of Supply and Authority on Brazing Alloys



HANDY & HARMAN

General Offices: 82 Fulton St., New York 38, N. Y.

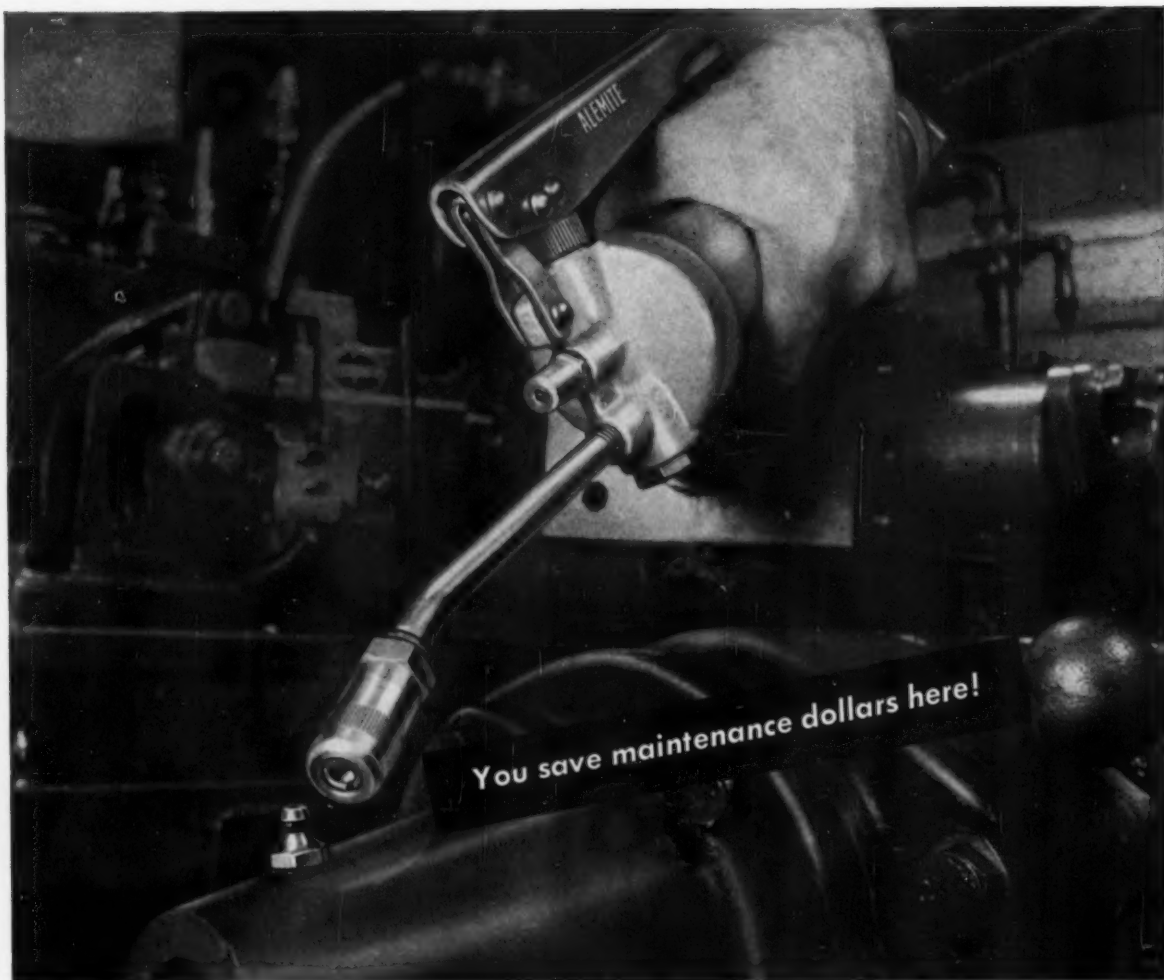
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Low-temperature silver alloy brazing with SIL-Fos and EASY FLO is described in our Bulletin 20. Write for your copy.





Alemite Hand Guns and Fittings Give You Up to 10,000 lbs. of Lubrication Power!

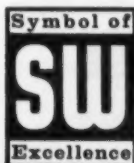
The point of lubrication is where maintenance costs can be cut—providing you have the right equipment for the job!

This heavy-duty Alemite hand gun—combined with genuine Alemite lubrication fittings—brings up to 10,000 lbs. of pres-

sure to even ordinary lubrication points. It gives you power to spare for fast, efficient, money-saving protection of every machine in your plant!

Gun handles all regular pressure gun greases. Long operating handle for maximum lever-

age. Loader fitting permits fast, clean filling (or gun may be filled by suction); Heavy steel linkage for true piston alignment. Capacity, 1 lb. Get more out of man-hours and machine-hours with Alemite lubrication equipment!



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DIVISION
STEWART-WARNER
CORPORATION

1850 Diversey Parkway, Chicago 14, Illinois

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1850 Diversey Parkway, Chicago 14, Illinois
Please send me free your complete catalog of Alemite
Industrial lubrication equipment

Name

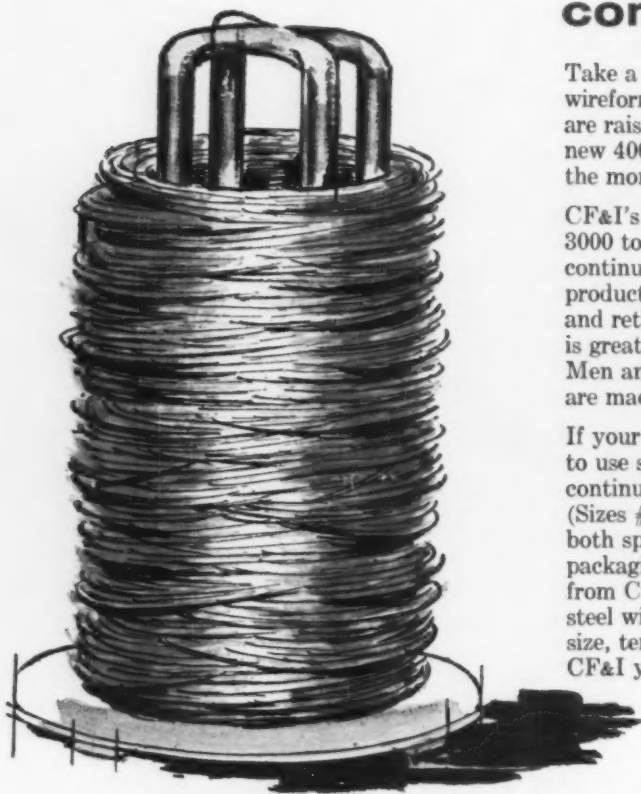
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for longer runs and lower costs

buy **CF&I** WIRE

**in 3000-4000 lb.
continuous lengths**

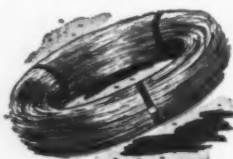


Take a cost-conscious look at your wireforming operation. If short length coils are raising costs and cutting profits, CF&I's new 4000-lb. "spider" package may provide the money-saving answer to your problem.

CF&I's returnable "spiders" carry from 3000 to 4000 lbs. of wire in a single continuous length. They can increase production because downtime to stop, reload and rethread your wireworking machines is greatly reduced. Scrap losses are minimized. Men and materials handling equipment are made available for other work.

If your manufacturing process is not equipped to use spiders, order our 200-2000 lb. continuous-length steel-strapped wire coils. (Sizes #13 AWG and coarser apply for both spider and coils.) Other standard packaging methods are, of course, available from CF&I. For high or low carbon steel wire; round, flat or shaped; in any size, temper, grade or finish, make CF&I your source of supply.

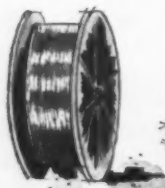
OTHER CF&I STANDARD PACKAGING METHODS



Steel strapped coils
(200-2000 lbs.)



Non-returnable spiders
(500-700 lbs. capacity)



Reels (500-800
lbs. capacity)



Pay-off paks



Steel strapped
wooden rack

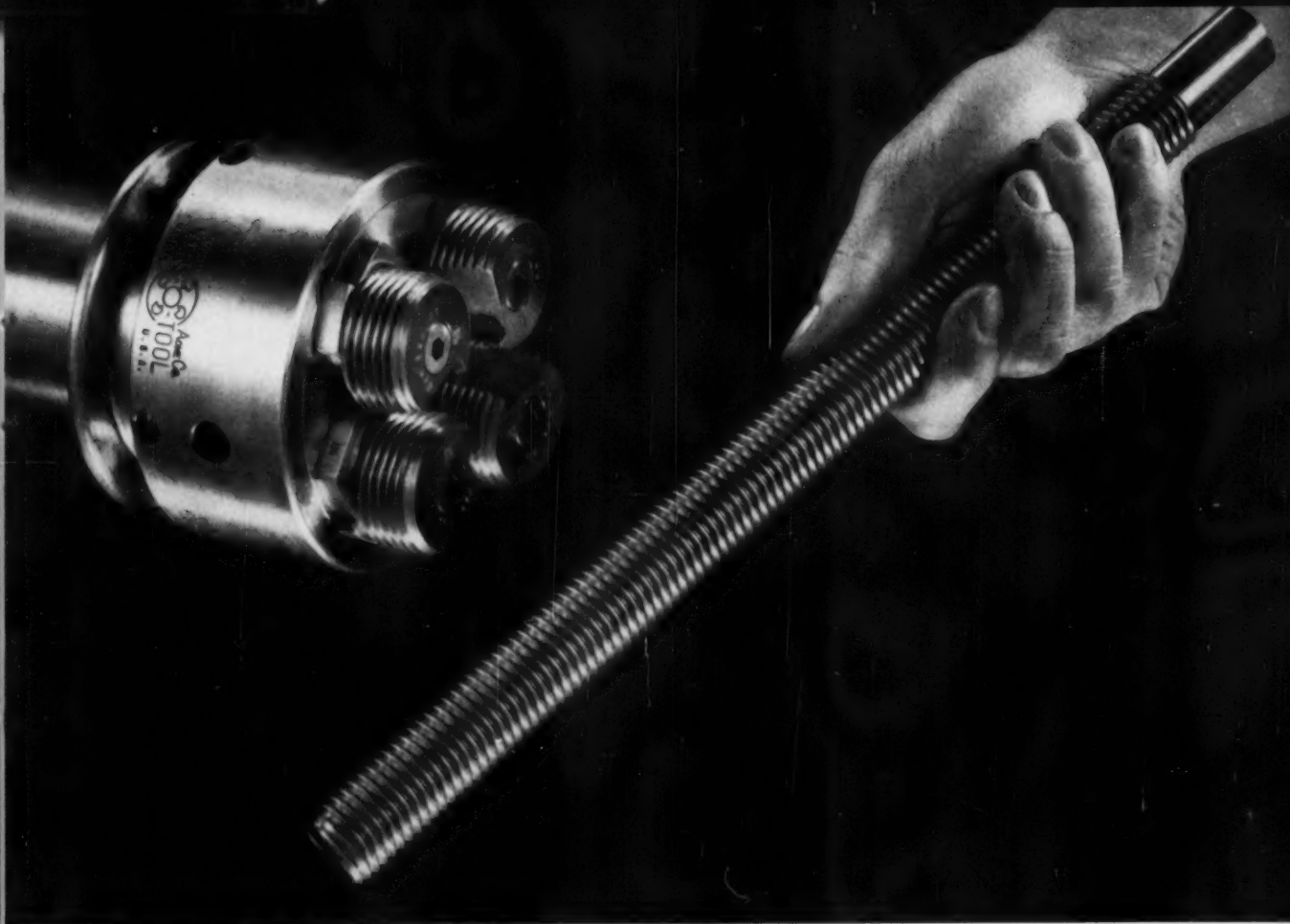


CF&I-WICKWIRE WIRE

THE COLORADO FUEL AND IRON CORPORATION

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VERS-O-TOOL cuts 10.3 miles of thread per grind on this job ...

The Federal Screw Works had a real problem in threading. They had received a large order for 1"x13" adjusting screws. Using most thread cutting methods this would be a big, costly assignment.

Federal put a Namco 1 1/4" DR Vers-o-Tool on the job and as a result, found they had to grind the chasers only once for approximately 2000 pieces. This means that each grind cuts well over 10 linear miles of thread. Threading cost per piece was amazingly low.

Remember, Vers-o-Tools can be used with your present turning equipment, lathes, drill presses or automatics. No investment in special machines required.

Find out how you can put Vers-o-Tools to work reducing your thread cutting costs. Write for a free copy of Booklet DT-52.

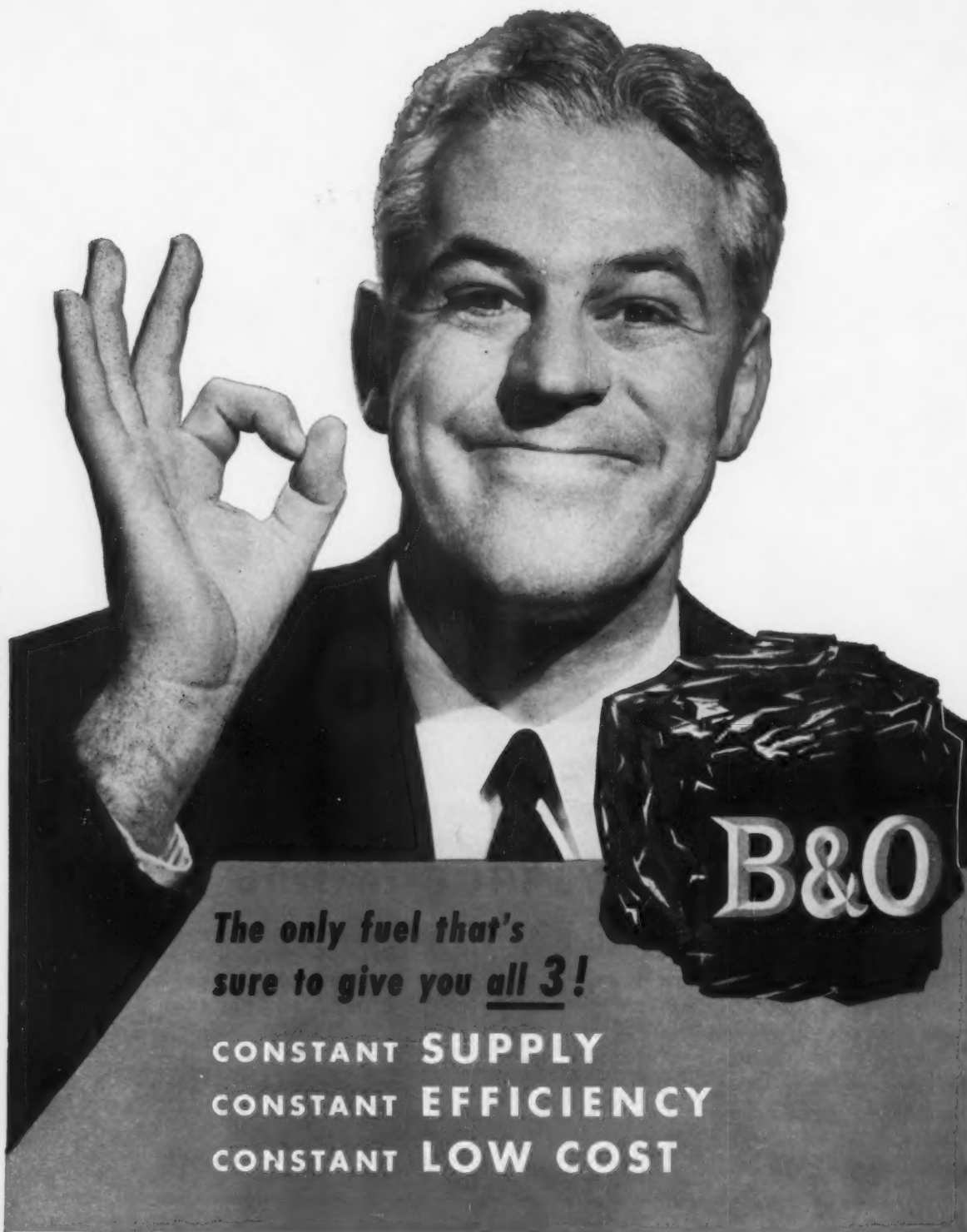


See Vers-o-Tools demonstrated at the A. S. T. E. Tool Show in Philadelphia, May 1-8, Booth #2115

You can grind and regrind Vers-o-Tool circular chasers to a full 270° of the chaser circumference.

National Acme

THE NATIONAL ACME COMPANY, 175 E. 131st St., CLEVELAND 8, OHIO • Sales Offices: Newark 2, N. J., Chicago 6, Ill., Detroit 27, Mich.



**The only fuel that's
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B&O **BITUMINOUS COALS FOR EVERY PURPOSE**
Ask our Man! BALTIMORE & OHIO RAILROAD, BALTIMORE 1, MD. Phone LExington 9-0400

DEMAG



Continuous broad strip finishing mill at
August Thyssen-Hütte

max. width of strip 1530 mm (60 1/4 inch.)
max. delivery speed 12 m./sec. (2360 ft/min)
Annual capacity 2 million metric tons

We plan and build complete
iron and steel plants, rolling mills,
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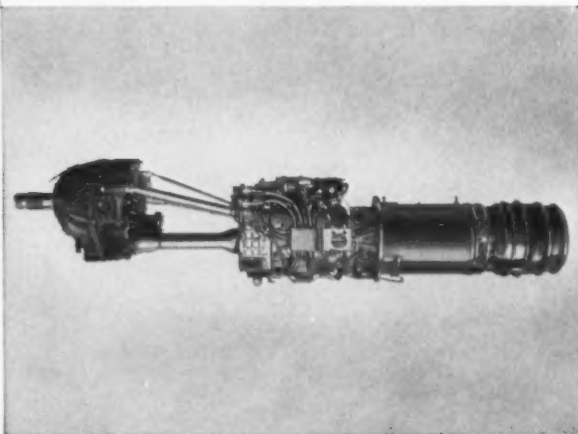


THE HEAVIER THE LOAD...

the more you need HYATTS . . . because nothing can touch the straight cylindrical roller bearing for downright load-carrying capacity and longer life in rugged applications like this heavy-duty tractor.

THE HIGHER THE SPEED...

the more you need HYATTS . . . because stringent controls and superior steels assure smoother, trouble-free performance in high speed applications like this powerful Allison turbo-prop engine.



Cylindrical

THE MORE YOU NEED  **HY-ROLL BEARINGS**



If you're like many engineers today, often faced with the problem of fitting heavier loads and higher speeds into smaller housings, HYATTS are your answer! You'll find your problems solved with bearings like the shouldered-race HYATT Hy-Rolls that handle rugged radial loads along with a surprising amount of thrust. You can save added space, too, by eliminating the outer or inner race of separable HYATTS, and operating the rollers directly on the hardened and ground shaft or housing bore. Check your nearest HYATT Sales Engineer for recommendations on your particular problems today! Hyatt Bearings Division, General Motors Corporation, Harrison, N. J.; Pittsburgh; Detroit; Chicago; and Oakland, California.

THE RECOGNIZED **LEADER** IN CYLINDRICAL BEARINGS

HYATT

HY-ROLL BEARINGS

FOR MODERN INDUSTRY



McKay ROLLER LEVELERS

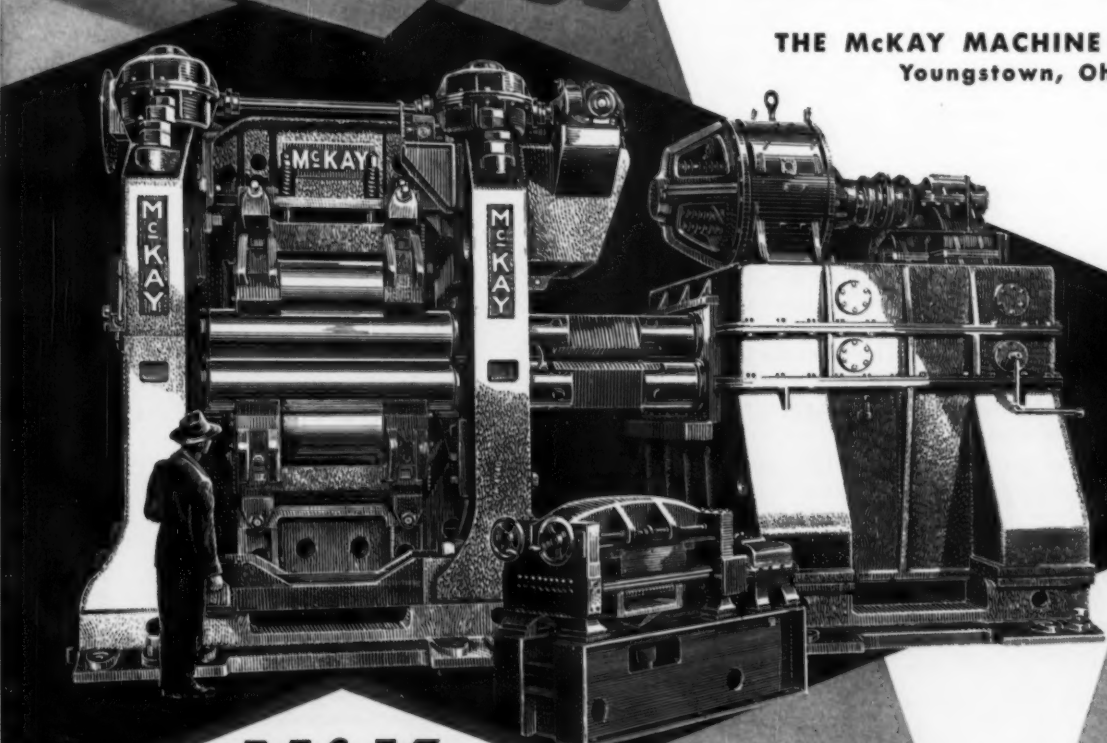
... From Tin Plate
to Ship Plate

Tin cans and super-tankers have more in common than cargo space — the flat steel of which they're made had to be roller leveled.

Regardless of the product — cans, cars, planes, appliances or ships — more fabricators will tell you that the "buy-word" in roller levelers is McKay. Write for Bulletin 100, or call for a McKay Application Engineer today.

THE MCKAY MACHINE COMPANY
Youngstown, Ohio

10036



A detailed black and white illustration of industrial machinery. On the left, a large roller leveler with two vertical columns labeled 'MCKAY' is shown. A worker in a hard hat stands next to it for scale. To the right is another large machine, possibly a press or another type of leveler. In the foreground, there's a smaller machine, likely a mill or lathe. The background features a large, stylized arrow pointing upwards and to the right, and a stack of cylindrical rollers.

MCK

SETTING THE STANDARDS OF QUALITY METAL WORKING MACHINES FOR TWO GENERATIONS

ANNOUNCING

SILNIC^(T.M.)

BRONZE BY CHASE®

NEW... Nickel Silicon Bronze that combines high tensile and high yield strength with high conductivity, excellent cold-forming characteristics and high corrosion resistance

Here's big news for every user of silicon bronze! New SILNIC^(T.M.) BRONZE by Chase is absolutely unique—the *only* alloy in the silicon bronze family that combines strength, conductivity and excellent cold forming characteristics to give your products sales and performance advantages never before available.

Look at the comparison chart. See how Chase SILNIC BRONZE compares with the alloys you have been using...how SILNIC BRONZE—an age-hardenable nickel silicon bronze—gives you a combination of properties no other alloy can match! This new alloy is available in rod and wire. Get full technical details right now by mailing the coupon.

The booklet you will receive gives you the *facts* you need to evaluate this new alloy for

your own use. In its pages, you will find listings of physical and mechanical properties; high temperature properties; corrosion resistance data; essential fabrication information. You'll find typical properties of some fabricated items reported, too.

New Chase SILNIC BRONZE has been thoroughly tested—in laboratories and on actual production jobs. Many months of work have developed full information about this new alloy. And it's all available for you!

So send in the coupon today for your free copy of the detailed Metallurgical Report on new SILNIC^(T.M.) BRONZE by Chase. Or see your nearest Chase Representative at any convenient office or warehouse listed below. But don't delay—find out about SILNIC BRONZE now!

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Compare
SILNIC BRONZE
for yourself!

Nominal Properties of 1" Dia. Rod, Hard Temper

| alloy | tensile strength PSI | yield strength 1/2" ext. PSI | elongation % in 4XD | Rockwell B center surface | | Elec. Conduc. (annealed, % IACS) |
|---|----------------------|------------------------------|---------------------|---------------------------|-----------|----------------------------------|
| SILNIC BRONZE | 100,000 | 80,000 | 17 | 92 | 90 | 36* |
| TYPE A SILICON BRONZE | 92,000 | 55,000 | 16 | 85 | 90 | 7 |
| TYPE B SILICON BRONZE | 70,000 | 55,000 | 10 | 75 | 80 | 12 |
| ALUM. SILICON BRONZE (91% Cu, 7% Al, 2% Si) | 90,000 | 50,000 | 37 | 82 | 92 | 7 |
| PHOSPHOR BRONZE Grade A | 80,000 | 70,000 | 20 | 80 | 85 | 14 |

*In fully heat-treated condition.

been the tendency to fire-
ing, not easily discernable in
ification and the costly inspec-
se **SILNIC BRONZE** is not
regation which leads to plane

(a low temperature heat
after this low temperature
d in the hard, fully age
ary. The cold forming
ve been fabricated. This cold
ne material is still in the very
quent low temperature age
s described in this report.

stress corrosion are high.
l stresses are nil since a
material.



PROPERTIES OF
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METALLURGICAL REPORT



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☐ I would like a Chase Representative to discuss SILNIC BRONZE with me.

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To help our customers who make and sell products of steel, United States Steel is launching a powerful new promotional program. Four-color spreads in *Saturday Evening Post* and *Time*, plus regular commercials on the *U.S. Steel Hour*, will show the public the many

and vital ways in which "Today's USS Steels lighten your work, brighten your leisure, widen your world." In addition, a continuing trade promotion will merchandise this theme, and assist our customers in developing greater sales for their steel products.

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Tennessee Coal & Iron • United States Steel Homes • United States Steel Products • United States Steel Supply and Gerrard Steel Strapping
United States Steel Export Company • Universal Atlas Cement Company

you get **STEEL+PLUS**



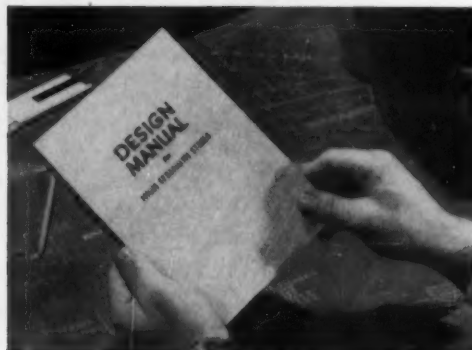
STEEL+PLUS IN ACTION: FACILITIES

It is very difficult to roll thin Stainless Steel sheets to extreme widths, but aircraft manufacturers needed them, so United States Steel found a way to do the job. Standard-size sheets of Stainless Steel are covered with heavy carbon steel plates, and the carbon plates are welded shut at the edges. The sandwich is then heated and rolled. Stainless Steel sheets as wide as 120 inches can be produced to exceedingly close tolerances with U.S. Steel's versatile facilities through this ingenious method.



STEEL+PLUS IN ACTION: RESEARCH

American railroads use hundreds of thousands of signal bonds—small copper jumpers that span joints between track sections and carry the electricity used in the vital train control signal systems. Researchers at the USS American Steel & Wire Division developed a bond with a built-in steel punch. Three whacks with a hammer and it's in to stay. No special driving tool is needed, and workers can install more per hour.



STEEL+PLUS IN ACTION: TECHNICAL ASSISTANCE

In the past three years, United States Steel has distributed over 80,000 copies of this 170-page "Design Manual for High Strength Steels." This is just one of scores of technical booklets that we prepare for our customers who want to know more about how to work with steel.

USS is a registered trademark



United States Steel



COMPUTER TECHNIQUES solve special gear and cutter designs

Giving designers exceptional freedom in their specifications for special gears to improve design, the electronic computer easily makes the calculations necessary for making cutting tools to meet the most critical requirements. This high-speed Bendix Computer shortens hours of calculation to minutes, permitting complete mathematical study of complex problems.

A punched tape holds the basic formulae, the computer program. Variables for a particular Fellows Cutter, Shaving Tool, or Master Gear are typed on an electric typewriter which feeds

them into the computer. As fast as the operator can type, the computer does the figuring which used to require hours of labor.

Fellows Gear Shapers tooled with Fellows Cutters lower costs and speed production on internal and external spur, helical and herringbone gears. Many examples of interest to designers are shown in the booklet, "The Art of Generating with a Reciprocating Tool." Just write any Fellows office for your copy.

THE FELLOWS GEAR SHAPER COMPANY
78 River Street, Springfield, Vermont

Branch Offices:

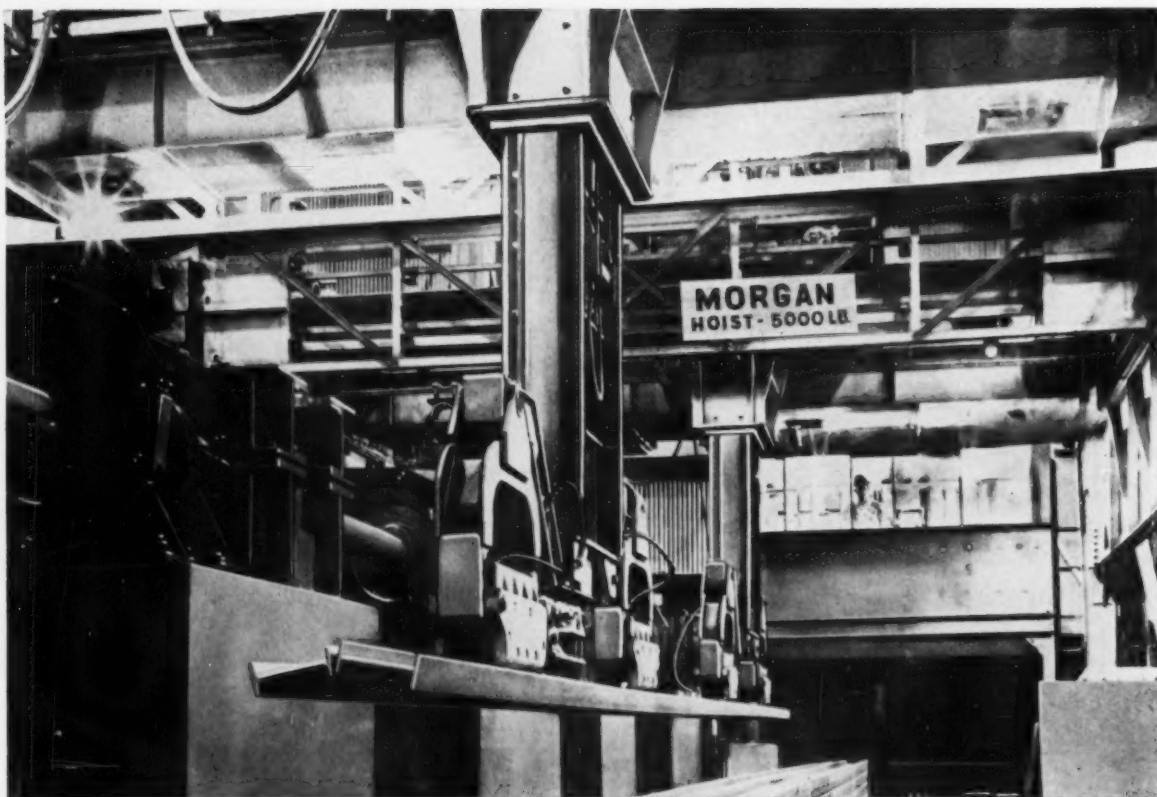
1048 North Woodward Ave., Royal Oak, Mich.
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THE
PRECISION
LINE

Fellows

Gear Production Equipment



Another steel-handling bottleneck broken ... by Morgan cranes and mill machinery

Now beams can be classified and nested with continuous flow production efficiency...and basic components of the system can be profitably applied to handling plates and slabs. Morgan Engineering designed and built the equipment that provides important savings by reducing manual operations and use of a crane withdrawn from normal service.

Beams move from the finishing line on a Morgan roller table and transfer chain assembly. Then they are stacked-to-order on a lower-level platform by the piler cranes.

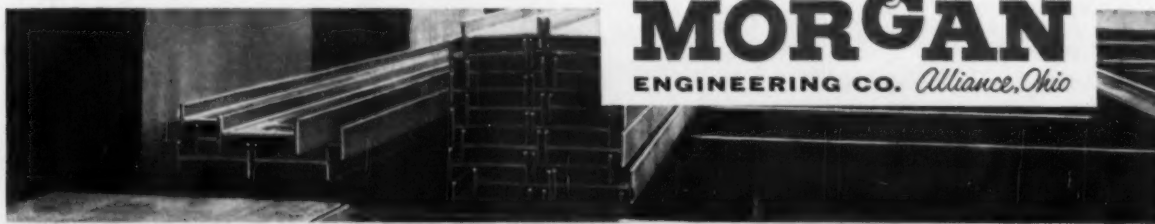
Two Morgan beam piler cranes, synchronized to work in tandem, handle beams up to 70 feet long...one or two at a time. Cranes can also be used

singly for handling shorter beams. The lower-level transfer chain platform carries stacked beams to position for movement to shipping or storage areas.

Cost-cutting automation and complete dependability are prime requisites for new steel-handling machinery of all kinds. Today's needs are met... and tomorrow's are anticipated... in Morgan equipment. Let Morgan Engineering help you reduce your production costs by applying our 90 years' experience in designing and building better cranes and mill machinery.



THE
MORGAN
ENGINEERING CO. *Alliance, Ohio*



Overhead electric traveling cranes, gantry cranes, open hearth special cranes, blooming mills, structural mills, shears, saws, auxiliary equipment and welded fabrications.



All "Special" Tools illustrated use Standard Kendex inserts, chipbreakers, clamps, shims and screws — simplifies stocking and reduces investment in inventories.

The tougher the competition the BETTER the reasons for tooling-up with KENDEX*

When you have to cut costs to the bone on every machining operation . . . that's when Kendex tooling can do the most for you.

In many shops, Kendex has doubled or tripled output per hour in addition to effecting great savings in machine downtime and through the elimination of costly regrinding . . . all adding up to tremendous savings *per finished piece*.

Kendex Tooling also eliminates costly chipbreaker grinding and the time-loss of tool repositioning after indexing. Kendex greatly reduces tool inventories as several standard types and sizes of inserts and *solid* Kennametal chipbreakers will service dozens of operations. The Kendex inventory involves only a fraction of the investment required to stock ordinary tools for the same operations.

Then, if you are adapting standard tools to special-

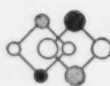
ized jobs, by all means investigate how easy it is to apply the Kendex principle to the special tooling you really need. Illustrated are a few of many special Kendex tools that are speeding production and squeezing profits out of close-margin jobs.

And don't forget—Kennametal Tooling Service provides you not only the finest in tools, but the cooperation of a Kennametal Service Man, who will work with your personnel in selecting, designing, and applying the proper tool for your tough operations. If desired, he can conduct "on the job" instruction for your operators.

More competitive times are a threat to the weak—but a challenge to the strong! Why not call in one of our representatives and find out the many ways to reduce machining costs per unit. Just get in touch with your nearest Kennametal office or write KENNAMETAL INC., Latrobe, Pennsylvania.

*Trademark

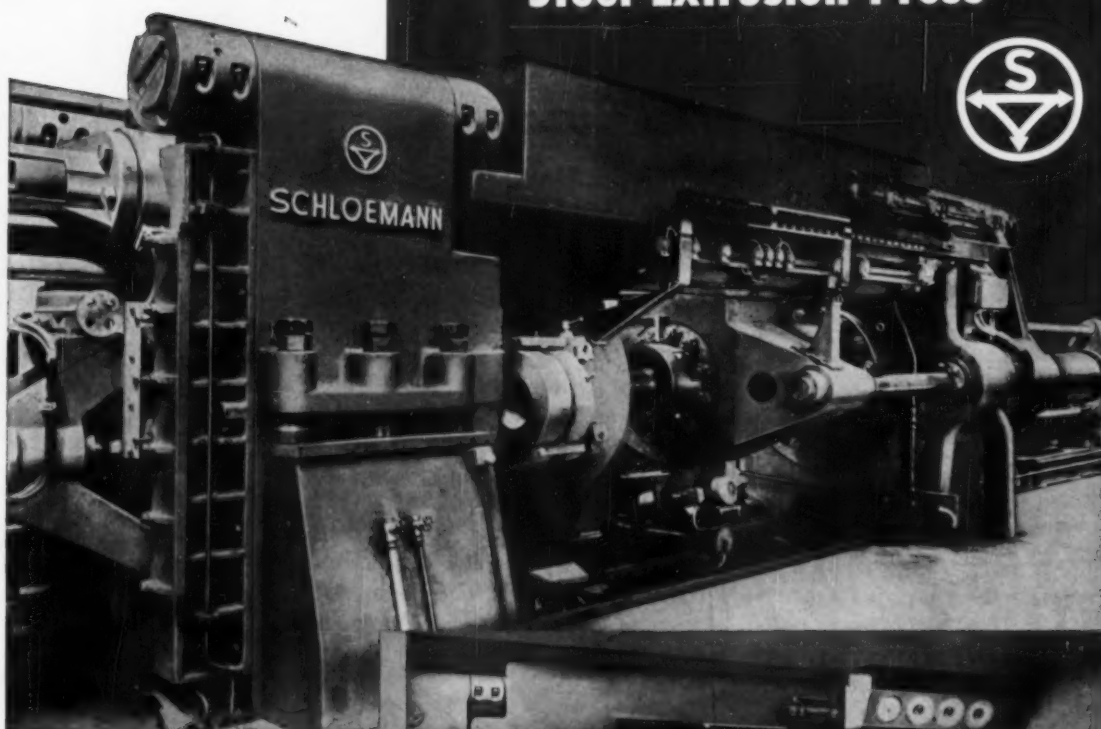
Visit Booth 1605 at the ASTE Show. See the complete Kendex Line — the original and most extensive line of "button" insert tooling available. Check how the Kendex principle has been adapted to cut costs on many special jobs.



INDUSTRY AND
KENNAMETAL
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SCHLOEMANN

Steel Extrusion Press



**The first to be operated
in Germany**



The illustrations show essential features of this 2,000 ton press of completely novel design: Overhead guide-ways for moving crosshead and billet container, double swiveling arm for die and butt-end with dummy block. The advantages of these innovations and other features of the press, which, when controlled automatically can attain an hourly production of 10 tons, are described in leaflet 21h/1e.

FELLER ENGINEERING COMPANY 1190 Empire Building, Pittsburgh 22, Pa.

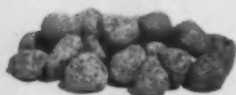
HOT AND COLD ROLLING MILLS • COUNTERBLOW HAMMERS • HYDRAULIC PRESSES

Now's the time...here's the place

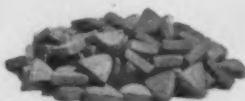


The big Norton Sample Processing Department solves your finishing problems with a wide variety of tumbling equipment . . . and the right abrasive to do the job.

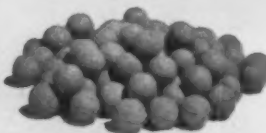
to find the tumbling abrasive you need



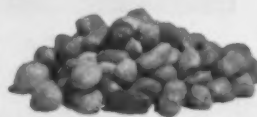
ALUNDUM® TUMBLEX® "A" Abrasive. For general barrel finishing. Removes flash, scale, tool marks and burrs, while forming radii and finishes to required micro-inches. Seventeen sizes.



ALUNDUM TUMBLEX "Y" Abrasive. Bonded, triangular and fast-cutting for special shaped parts. They won't wedge in work slots or holes. Four sizes.



ALUNDUM TUMBLEX "S" Abrasive. Bonded spheres that get into areas where other shapes can't reach. Exceptionally dense and long lasting. Five sizes.



TUMBLEX "N" Abrasive. Natural stones, exclusively Norton. For high lustre, especially on die castings and soft metal. Rounded shape brings up highest lustre. Seven sizes.

G-341

If you're still finishing metal parts the long, hard way, now's the ideal time to find the fastest, most effective barrel finishing equipment, methods and abrasives.

For example, one leading aircraft parts manufacturer reports saving over \$90,000 yearly by shifting from hand-finishing to barrel finishing with Norton TUMBLEX abrasives.

There's one sure way for you, too, to get these cost-cutting, product-improving "Touch of Gold" advantages. Your metal parts can range

from tiny needles to hefty forgings . . . may be simple or complicated, hard metals or soft . . . may require deburring, descaling, better color and closer finish. Just send sample parts to our Sample Processing Department. They'll be returned to you completely finished to requirements, with a detailed report. Or, next time you're in our area, drop in and learn how your finishing can be improved.

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ABRASIVES

*Making better products...
to make your products better*

NORTON PRODUCTS

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Coated Abrasives • Sharpening Stones
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Mechanized Cutting Speeds Scrapping of 95-Ton Pressure Vessels



Scrapping huge pressure vessels loomed as a costly, time-consuming job for a large scrapyard in Birmingham, Alabama. But mechanized oxygen-cutting quickly cut this job down to size—and with substantial savings in labor and materials.

The versatile OXWELD CM-45 Portable Cutting Machine teamed up with a C-56 Blowpipe to slice through 8-in. thick laminated steel walls at a speed of 4 to 5 in. per minute. Two 24-ft. cuts were made in each vessel in less than two hours' time. Transverse cuts were then made to reduce these sections to charging-box size.

Today scrapyards, fabricators, and maintenance shops everywhere are slashing costs with the speed and efficiency of mechanized oxygen-cutting.

See how you, too, can save. Ask your nearby LINDE representative to show you the *complete* line of dependable OXWELD Portable Cutting Machines—or write for free catalog F-4487. Do it today!

LINDE COMPANY

DIVISION OF



CORPORATION

30 East 42nd Street, New York 17, N. Y.

"Linde," "Oxweld," and "Union Carbide" are registered trade-marks of Union Carbide Corporation.

AUTOMOBILE TORSION BAR ANCHOR HOUSINGS

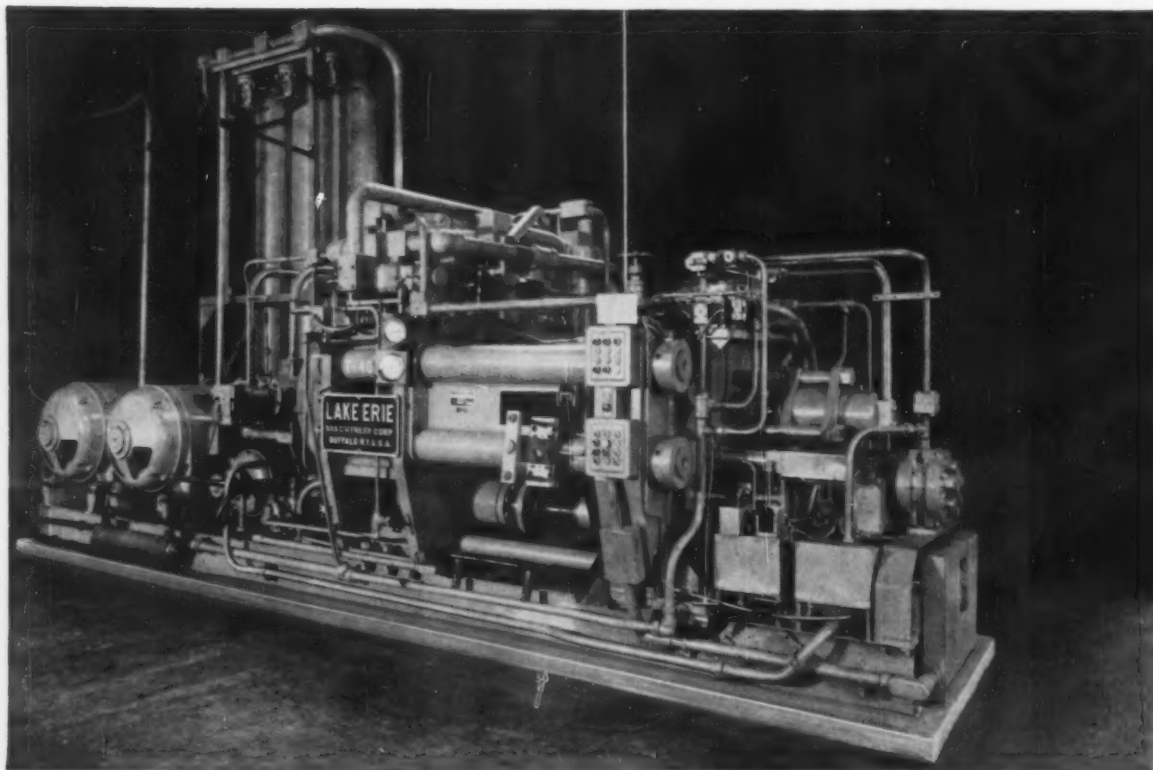
Automatically cold extruded

FROM
1035
STEEL



at a rate of 525/HR*

*Approximately 3 times screw machine production rate



- 40% of material saved
- Concentricity held to .010" total indicator reading
- Machining and labor costs greatly reduced
- Cold working eliminates heat treatment
- Physicals of finished piece improved

An experienced Lake Erie engineer will be glad to discuss material-saving, labor-saving, money-saving cold extrusion with you. He's as close as your phone.

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TOOLING BY
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LAKE ERIE MACHINERY CORPORATION, successor to

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BRIEFS for buyers of

Caustic Soda

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Caustic Soda Buyer's Guide offers fast facts

Quick answers to questions on caustic soda abound in this pocket-sized booklet.

You'll find in it basic information on forms and grades, containers and shipping methods.

One section deals with the comparative economics of 50% and 73% liquids solutions. It includes a table and nomograph to help you decide which concentration is the *better* buy for you.

Another nomograph helps you estimate instantly how much caustic of a given strength you need to get a given volume of your process solution.

We've also pointed out some factors you might consider when choosing a supplier.

Just clip the coupon for a copy.

How to help keep arsine out of pickling baths

If there is any arsenic in the muriatic acid you use for pickling, it can combine with free hydrogen to form arsine, a dangerous compound to have around.

Arsenic can also be reduced to the metal, leaving spots on the articles you pickle.

All this makes us happy that there

is not a bit of arsenic in either of the grades of muriatic acid we sell. In fact, the level of all impurities is quite low. Sulfates check in at a low 0.003% in both our Commercial Grade and Hooker White Grade. There's less than 0.0005% iron in Commercial, less than 0.0001% in Hooker White.

We ship both grades in 18°, 20°, and 22° Baumé solutions in rubber-lined tank cars. Literature will be sent upon coupon request.

Are your degreasing costs too high?

If they are, one reason may be that you have to constantly add new stabilizers to the trichlorethylene you use.

If you are one of those who have to titrate baths frequently and then freshen them up, you may be surprised to learn that there is a trichlor you never have to add stabilizer to—NIALK® TRICHLOR.

NIALK, and only NIALK, has *psp*

—permanent STAYING power—in its neutral stabilizer. This stabilizer just does not wear out during normal use. Even after repeated distillation, it's still active, still protecting your trichlorethylene against heat, light, air, moisture, acids, and active metals.

If you'd like to know more about this stable trichlorethylene, send us the coupon.

Electroless nickel plating with $\text{NaH}_2\text{PO}_2 \cdot \text{H}_2\text{O}$

There's been a lot of activity of late in the electroless nickel plating of metallic and plastic objects by co-deposition of metals and metallic phosphides.

This probably explains the increased business we're enjoying with our sodium hypophosphite, commercial grade.

Our free-flowing, white, odorless crystals are available in 25- and 100-lb. fiber drums.

Our technical data sheet is offered in the coupon.

For more information on the chemicals mentioned on this page, check here:

- ☐ Caustic Soda
- ☐ Muriatic Acid
- ☐ Trichlorethylene
- ☐ Sodium Hypophosphite

Keep your file current with data on these other Hooker chemicals:

- ☐ Virgo® Descaling Salt
- ☐ Virgo Electrolytic Salt
- ☐ Virgo Molten Cleaner
- ☐ Oxalic Acid

Clip and mail to us with your name, title, and company address. (When requesting samples, please use business letterhead.)

HOOKER ELECTROCHEMICAL COMPANY

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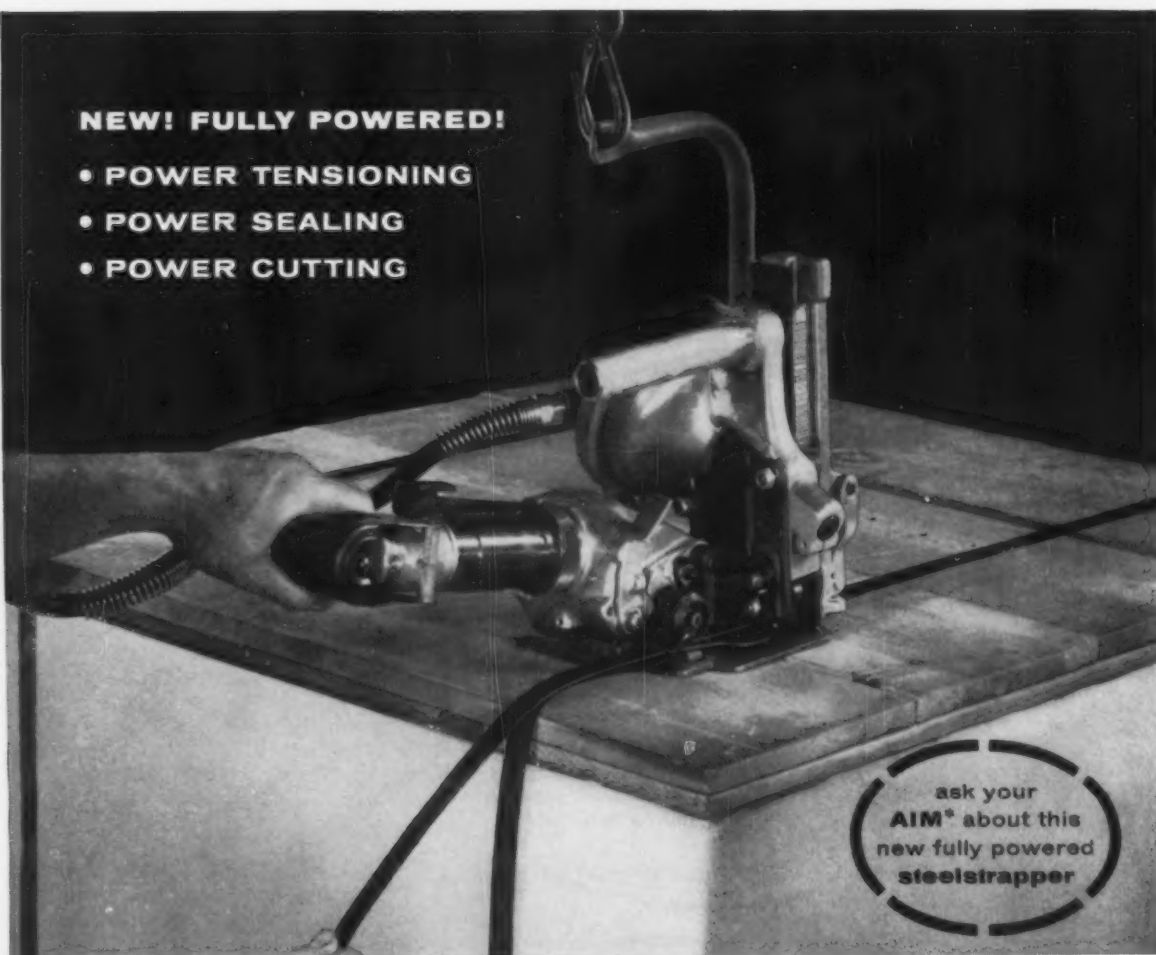
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NEW! FULLY POWERED!

- POWER TENSIONING
- POWER SEALING
- POWER CUTTING



Announcing another Acme Steel first...

The new, fully powered A4 Steelstrapper

ACME STEEL COMPANY is first to offer industry a Steelstrapper that tensions, seals and cuts steel strapping automatically... all with air power. Called the A4 Pneumatic Steelstrapper, this new tool includes one-hand controls among its many features.

With steel strapping quickly and easily inserted, the operator merely presses a control on the handle to power-tighten strapping to predetermined tension. And then with another power control on the same handle, magazine-fed seals are applied and the steel strapping cut without waste or operator effort.

Your *Acme Idea Man can demonstrate the new A4 Pneumatic Steelstrapper and show you its many time, effort and money saving advantages. The first full-power tool of its kind, the new A4 Steelstrapper will give maximum performance in your steel strapping application.

Contact your Acme Idea Man at the nearest Acme Steel Company office. Or write: Dept. IFS-48, Acme Steel Products Division, Acme Steel Company, Chicago 27, Illinois. In Canada, Acme Steel Company of Canada, Ltd., 743 Warden Ave., Toronto 13, Ontario.

Ask your Acme Idea Man, or write, for your free brochure detailing the features of the new fully powered A4 Steelstrapper.



**ACME
STEEL**

STEEL STRAPPING

THEY get to take a last look inside

*Standard Oil research
develops method
for inspecting
lubrication
of enclosed parts
without disassembling*



What if you had to make a final inspection of enclosed parts to be sure they were lubricated and you could not do it without disassembling? Standard Oil research scientists have just developed an instrument system that determines lubricant level in an instant. The device measures the density of an assembly so precisely the presence or absence of the desired quantity of lubricant registers on a meter.

Having such a unit might permit you to shorten an assembly line or reorganize assembly operations for greater convenience, speed, economy. The research men at Standard who developed this inspection method will be glad to share their know-how with you to help you fit it to your assembly operations.

This is the research pay-out you get from Standard. This is the "something more" Standard gives to industry besides the research which has established Standard Oil petroleum products as the industry criteria for quality.

For more information about this development or for assistance on other lubrication problems, inquire of any of the 48 Standard Oil district offices in the 15 Midwest and Rocky Mountain states. Or write **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**



You expect more from **STANDARD** and get it!

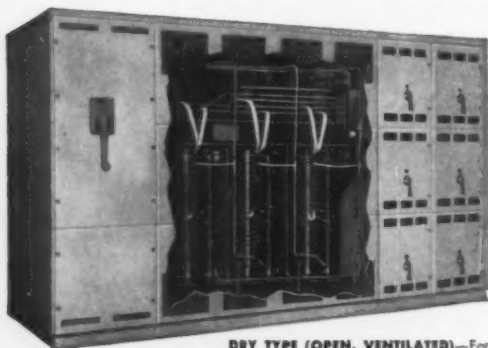


Can your in-plant distribution system meet tomorrow's needs?



WAGNER UNIT SUBSTATION TRANSFORMERS

will assure continuous dependable power for years to come!



DRY TYPE (OPEN, VENTILATED)—For indoor use only. Light in weight...ideal for multi-storied buildings...no fireproof vaults necessary.

Nothing is more important to your plant than an uninterrupted flow of power. You can't afford to be handicapped by a system that is unable to meet expanding demands.

It will pay you to check over your distribution system—find out how adequate your transformers are for present and future load requirements.

And it will pay you to specify Wagner PREDESIGNED Transformers for your load-centers. You will save time—save job engineering costs—and get liberally designed transformers with the switchgear of your choice. Wagner PREDESIGNED Transformers are engineered to meet heavy industrial demands. They are built in standard ratings which are coordinated with the specifications of unit substation builders.

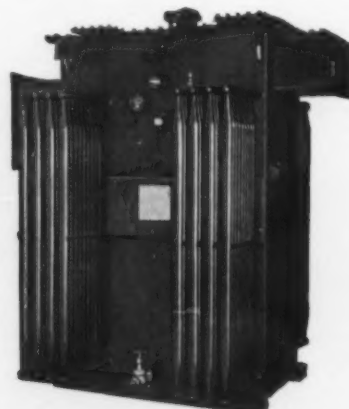
Bulletins TU-205 and TU-214 give full information on Wagner Unit Substation Transformers for industrial power needs. Write for your file copies today.



CLOSE-COUPLED. These transformers fit flush against switchgear enclosures, eliminating throats and saving space...available in ratings from 500 through 2000 kva.



NITROGEN-FILLED. These Class H. Silicone Insulated Transformers offer many advantages in maintenance and safety. Suitable for indoor or outdoor use...completely fireproof. In ratings up to 2000 kva.



OIL AND NOFLAMOL-FILLED. Oil-filled transformers are generally used outdoors. Noflamol type is filled with a nonflammable liquid making it especially suitable for locations where explosive liquids and gases are present.



T97-5

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

Wagner Electric Corporation
6403 Plymouth Ave., St. Louis 14, Mo., U.S.A.

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES • AUTOMOTIVE BRAKE SYSTEMS—AIR AND HYDRAULIC

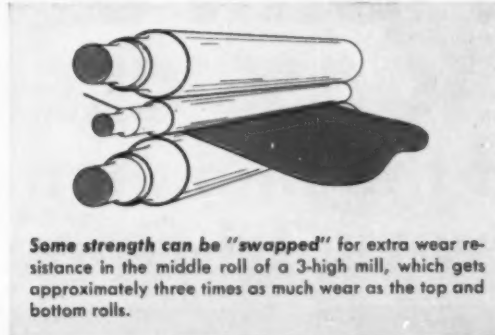
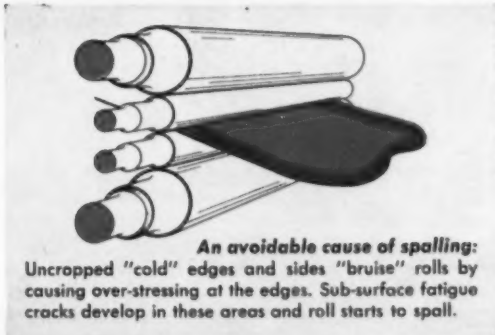


TIPS FROM A ROLL MAKER'S NOTEBOOK

MACKINTOSH-HEMPHILL DIVISION, E. W. BLISS COMPANY, Pittsburgh 3, Pennsylvania

Cast mill rolls • Johnston cinder pots • rotary tube straighteners • end-thrust bearings • heavy-duty lathes • steel and special alloy castings

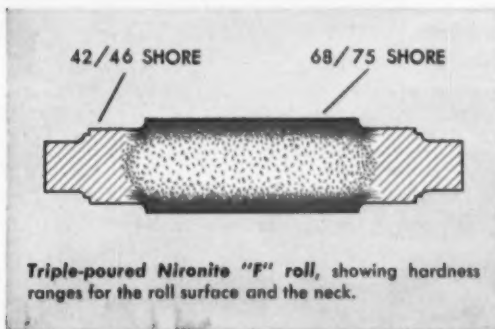
How to get longer life from plate mill work rolls



In plate mill work rolls, the balance of strength-vs.-hardness varies with the type of mill, the stand, and the rolling stresses involved. In general, however, the harder the rolls, the better.

This is particularly true of the work rolls in a 4-high mill and of the middle roll in a 3-high mill when used for finishing passes. On the other hand, the absence of grinding facilities in some plants often puts a limit on hardness, since the rolls must be soft enough to machine.

Spalling and fire cracking — With the many suitable combinations of mechanical properties available today, the life expectancy of a cast iron plate mill work roll depends largely on its resistance to fire cracking and spalling. And the current demand for good plate finish has placed even more emphasis on roll surface condition.



Three kinds of iron in a single roll — Mack-Hemp metallurgists have answered all these requirements in the Nironite "F" roll, a high-alloy grain-type roll.

Nironite "F" rolls are always double-poured, and sometimes even triple-poured. The deep outer shell is nickel-chromium alloy iron—very hard, very dense, and highly resistant to fire cracking. The second metal, a soft gray iron, provides the strength and resistance to impact needed in the core. Finally, the necks of all large Mack-Hemp plate mill rolls are cast with a third alloy whose carbon content is closely controlled. This third pour eliminates the tendency to weakness and coarse grain structure often encountered in the necks of double-poured plate mill rolls (a result of the slow cooling rate of the large mass of metal in the necks). It provides increased strength and a fine grain structure that prolongs the life of the roll neck bearings.

Another Nironite grade—Nironite A—is also widely used for work rolls in many plate mills. A single-poured cast iron grain roll of slightly lower alloy content than the iron of the first pour in Nironite "F" rolls, it provides excellent strength properties at somewhat lower hardness levels.

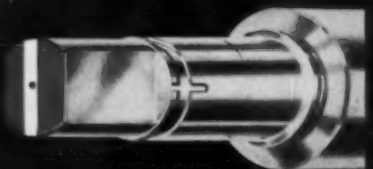
No matter what type of rolling you do . . . ferrous or non-ferrous . . . Mack-Hemp roll engineers and metallurgists can help you with your special problem. Simply write Mackintosh-Hemphill Division, E. W. Bliss Company, 901 Bingham Street, Pittsburgh 3, Pa.

MACKINTOSH-HEMPHILL

You get more tonnage from the rolls with the Striped Red Wabblers

Division of E. W. BLISS COMPANY

Presses, Rolling Mills, Special Machinery



GREAT PRODUCTS MADE GREATER WITH **"hi-Spec"** GALVANIZING

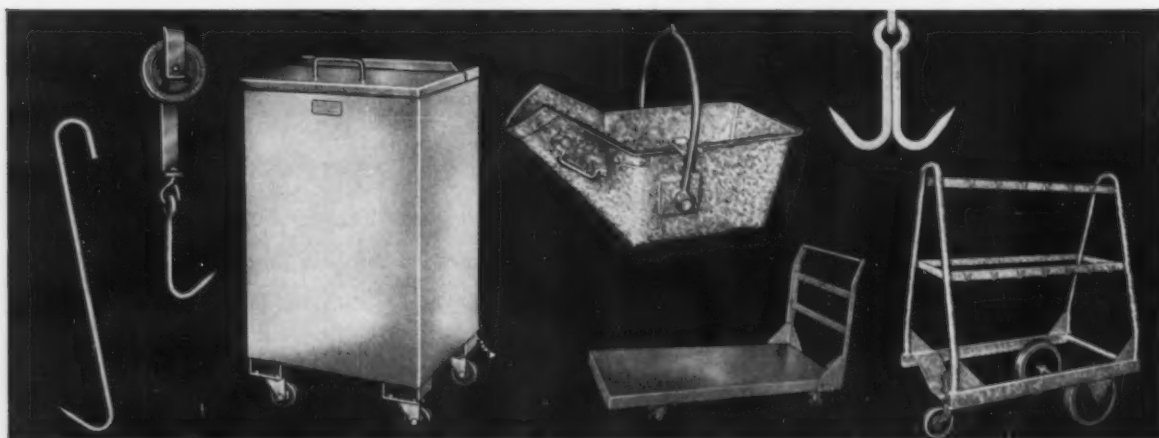


...from the hoof

...to the table



ST. JOHN & CO. INSURES 100% CLEANLINESS and the minimum of maintenance WITH **"hi-Spec"** GALVANIZING



Contamination, discoloration and taint of any kind must be guarded against at all times in the processing of meat.

This means that all the equipment used in the long process from "the hoof to the table" must have maximum protection against corrosive animal fluids and strong alkaline cleaning solutions.

Trouble free maintenance and long life is built into St. John and Company Products because they specify "hi-Spec" galvanizing — the process that provides a thicker rustproof coating than is called for in Federal, Mill or even ASTM specifications.

"hi-Spec" galvanizing flows evenly over all the surfaces, forming smooth fillets that eliminate hard-to-clean corners and means longer life for the equipment and cleaner food products.

"hi-Spec" galvanizing plays in making St. John equipment a leader in the food processing and meat packing fields.

MAKE YOUR PRODUCT GREATER

WITH **"hi-Spec"** GALVANIZING

EXCLUSIVE PROCESS OF

AMERICA'S FOREMOST QUALITY GALVANIZER



Metal Coating Corporation

Frontier 6-3800

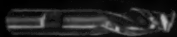
The Metal Coating Corporation is proud of the part 1215 West 37th Street, Chicago 9, Illinois

COMPARE this DoALL 3-flute end mill

A few of the types available



D-645—3 Flute Ball End



D-680—2 Flute for Aluminum



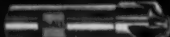
D-618—2 Flute Long Flute



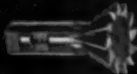
D-675—Controlled Penetration



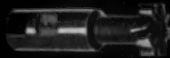
D-690—Tapered 3 Flute



D-638—Corner Rounding



D-751—Dovetail



D-571—T-Slot



D-636—2 Flute Stub Flute



D-606—4 Flute

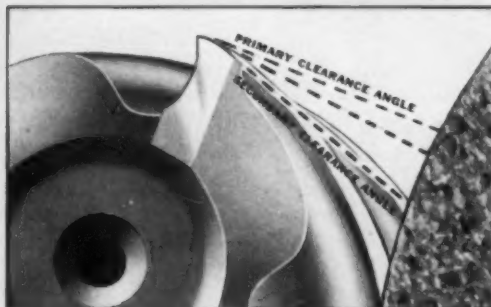


Three flute end mills with 2" diameter and 2" shank in 4", 6", 8", and 10" flute lengths—another case of how specials are standard at DoALL.

it gives you the plunge-cutting advantages of 2 flutes
... the fine finish of 4 flutes!

You can greatly cut your milling time and costs with this DoALL End Mill. One fast operation eliminates the need of both rough and finish cuts. No extra cost for this DoALL double-feature advantage, either. Also available with ball ends.

Turning out your work faster is only the start of it. Like all DoALL End Mills, it will turn out the work longer as well. Special high-speed, high-strength DoALL steels is one good reason. So are all these others: DoALL End Mills are completely finish ground with polished flutes after hardening and have a high helix angle which promotes smoother cutting... spiral flutes are hollow ground for better chip removal and less abrasive action.



Radial ground double back-off design gives maximum strength on the cutting edge for highest speeds and feeds.

one of over 600 sizes —

DoALL stocks many standards which are specials with others!

No compromising on *what* you want and *when* you want it with DoALL End Mills. Your needs are met completely and quickly from your nearby DoALL Sales-Service Store, where top stocks totaling over 600 different types and sizes are within one-call reach. Profit from this specialized end mill service now!

FREE FOR YOU! The end mill speed selector chart that makes sense by saving time and chance of error! DoALL has put recommended speeds in revolutions per minute. A glance gives you your setup answer for every job. No cost just call your DoALL Store.

CT-37



THE **DoALL** COMPANY, Des Plaines, Ill.



Machines and Blades



Surface Grinders



Power Saws



DoALL SAW BANDS



MEASURING INSTRUMENTS



SHOP SUPPLIES



DoALL GRANITE PLATES

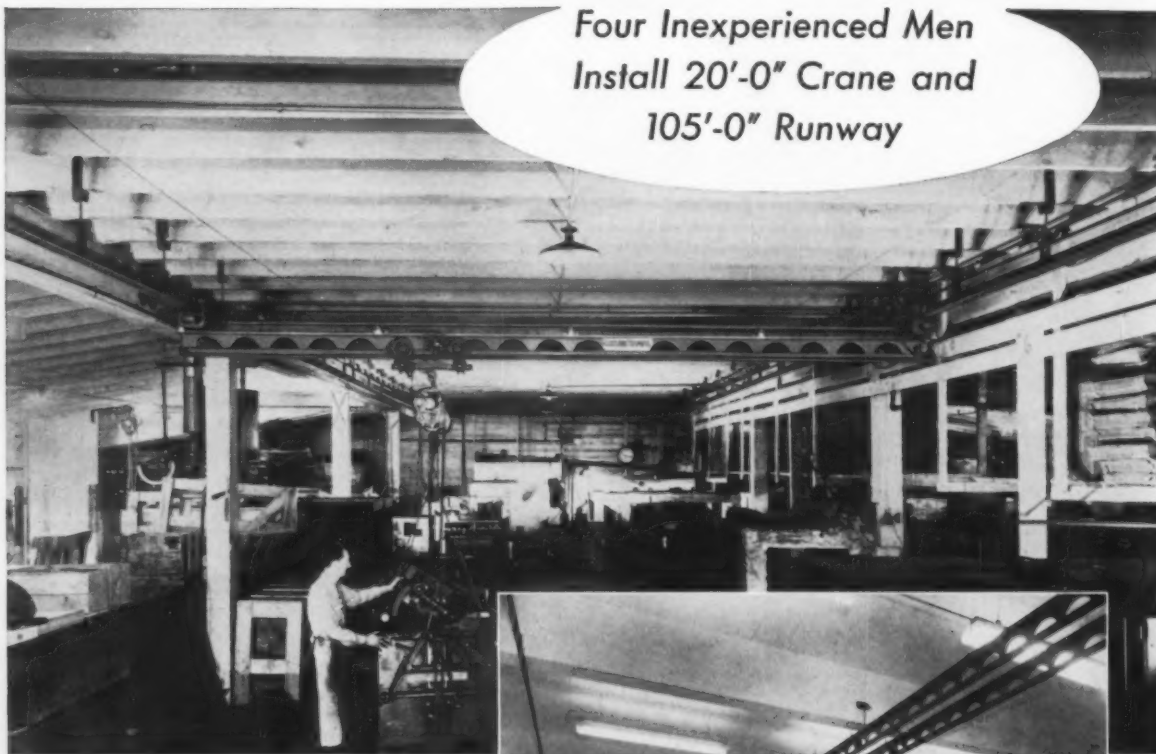


DoALL END MILLS

MACHINE TOOLS CUTTING TOOLS MEASURING INSTRUMENTS SHOP SUPPLIES IN STOCK

Erects Own Tramrail System in **One Day!**

Four Inexperienced Men
Install 20'-0" Crane and
105'-0" Runway



This entire crane installation was erected by four inexperienced men in 7¼ hours. It permits storing more in a given area and makes the work of handling heavy machines much easier.

New 10,000 square foot plant addition for parts department and assembly section. The entire space is void of posts and pillars. Cleveland Tramrail cranes provide complete mobility of machines over the entire area.



THE ease and speed with which Cleveland Tramrail overhead materials handling equipment can be erected was forcefully demonstrated at the Armstrong Manufacturing Co., Portland, Oregon.

This company has specialized for more than 50 years in the manufacture of precision saw maintenance equipment for the entire lumber industry. It wished to erect a crane and runway as quickly and economically as possible. A shop foreman and three laborers were assigned to the job. All of the men were inexperienced, having never done any erection work of this nature before.

The entire crane installation, consisting of a 20'-0" crane and 105'-0" runway, was put up in 7¼ hours. The work required the drilling of holes into wood ceiling beams and bolting yokes into place. The track was erected quickly be-

cause of Cleveland Tramrail's flexible method of support which permits easy leveling and height adjustment. This readily compensated for the slight roof pitch. Only the one-ton hoist is electrified. For this, three conductor bars were installed along one runway track and on the crane bridge.

This installation has proven such a great space saver and labor saver that an extensive Cleveland Tramrail installation was incorporated into a 10,000 square foot building addition recently completed.

CLEVELAND  TRAMRAIL

Overhead Materials Handling Equipment

CLEVELAND TRAMRAIL DIVISION • THE CLEVELAND CRANE & ENGINEERING CO. • 4837 E. 290 ST. • WICKLIFFE, OHIO

FULL ELECTRICAL CONTROL



...and other
outstanding features for

FASTER, BETTER, LOWER COST
Boring, Facing, and Turning

with the ALL-NEW

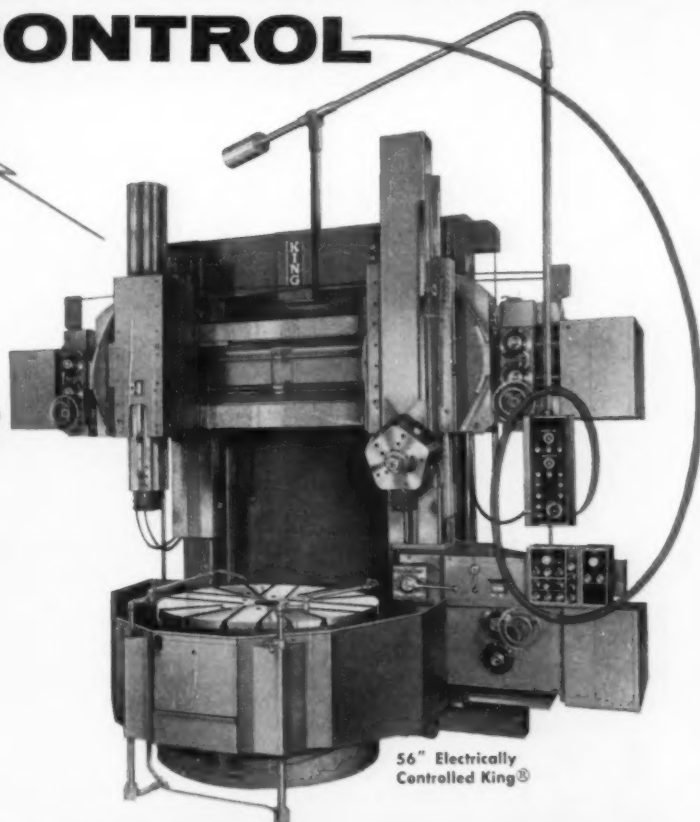
KING

Here is boring mill control manipulation cut to a bare minimum . . . all controls *electrical* . . . all controls literally at the operator's *fingertips*!

On these new KING® Vertical Boring & Turning Machines, direction of head movements is by simplified "up-down" and "in-out" switches; spindle speeds and feeds—both in expanded ranges—are pre-selective from direct-reading dials. The new KING is huskier and more powerful, too. Increased machine rigidity and higher horsepowers take *full advantage* of the capabilities of modern cutting tools.

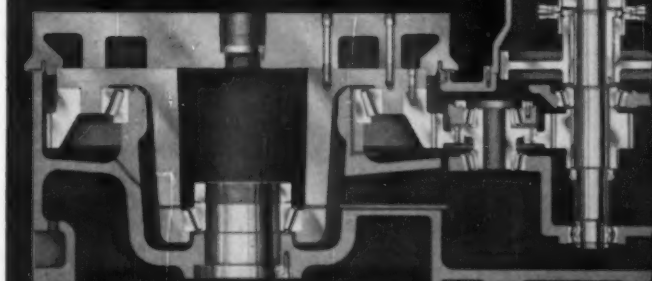
The new KING will bring to your operation, as it is bringing to so many others, all-important competitive advantages in faster set-up . . . faster operation . . . higher, uniformly maintained accuracy . . . greatly increased productivity . . . *profit-making performance*.

For complete details see your authorized King Distributor, or write us direct.



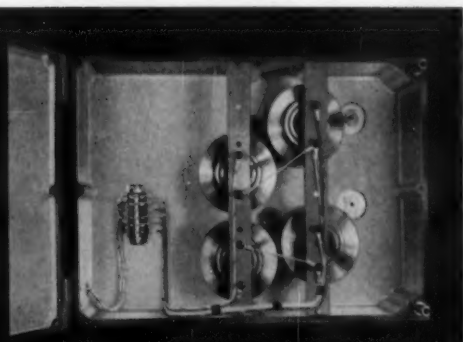
56" Electrically
Controlled King®

IMPROVED SPINDLE MOUNTING—Extra-heavy and rigid spindle is mounted on tapered-roller, preloaded bearings. Combined with the helical gear type drive, this design eliminates any tendency toward spindle deflection—provides higher, uniformly maintained accuracy.



MAGNETIC-CLUTCH TRANSMISSION
for feed rods. Pushbutton operated. Instantaneous engagement and disengagement of feeds assured. No periodic adjustment needed . . . clutches are easily removed for maintenance.

UNIT CONSTRUCTION OF DRIVE
Extra-rugged housing provides increased rigidity for mounting of shafts. Heat-treated alloy gears, and shafts mounted in anti-friction bearings, used throughout. Drive removable as a unit for easy maintenance.



KING VERTICAL BORING & TURNING MACHINES

American Steel Foundries
KING MACHINE TOOL DIVISION
1150 Tennessee Avenue, Cincinnati 29, Ohio

*Bridgeport Brass chooses
SPEEDOMAX® H CONTROL
for vacuum annealing Ti, Zr
and special alloys*

Bridgeport, Conn.—Vacuum anneal . . . cool . . . then draw! Again and again . . . until the seamless tube of titanium, zirconium or special alloys takes final dimensions.

That's the procedure at Bridgeport Brass Company's Housatonic Plant where reliable Speedomax H temperature control is helping them produce tube after tube of the same high quality.

Quantity production of these tubes requires close control of all variables, particularly atmosphere and temperature.

To minimize loss of the expensive "new" metals and to maintain chemical and physical characteristics, Bridgeport Brass Co. installed a HIVAC vacuum annealing furnace with a Westinghouse heating chamber over a year ago. With evacuation held to 0.01 micron, four Speedomax H instruments provide D.A.T. control . . . constantly regulate power input to hold product temperature well within



specifications. Such dependable automatic control is resulting in production savings which make the use of these new metals more economical.

You may not be vacuum annealing . . . but no matter what your heat treat, it'll pay you to investigate Speedomax H. Its workhorse characteristics . . . its two to four week delivery . . . and its moderate price now, more than ever before, make this null-balance controller an attractive investment.

A phone call or letter to your nearest L&N office or to 4956 Stenton Ave., Phila. 44, Pa. will bring more information. Ask for data sheets.



LEEDS  **NORTHROP**
Instruments Automatic Controls • Furnaces

Waterbury Farrel TANDEM ROD MILLS *in Action...*

You can reduce 1" rod down to 5/16" efficiently and economically on Waterbury Farrel Tandem Rod Mills. Here are the specific advantages provided by these mills over the older process of drawing through dies after the 3-high mill operation:

Advantages



- Does not Require Pointing.
- Much greater reduction in single pass.
- Greater Production rate.
- Reduces handling time.
- Anneals at lower temperature and results in better surface and grain structure.
- Eliminates intermediate annealing or pickling.

Represented at the right are a few of the companies taking advantage of these production benefits. Each installation illustrates Waterbury Farrel's custom-engineering ability to design and build rugged, dependable equipment for specific production needs. Whatever your rod requirements may be, Waterbury Farrel can furnish a Tandem Rod Mill to fit your program.



Write today, for your free copy of Tandem Rod Mills Circular No. 729-R.

THE WATERBURY FARREL

FOUNDRY & MACHINE CO.
WATERBURY, CONN., U.S.A.

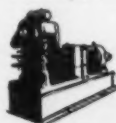
Sales Offices: CHICAGO • CLEVELAND • MILLBURN, N. J.



Belt, Nut & Screw Machinery



Power Presses



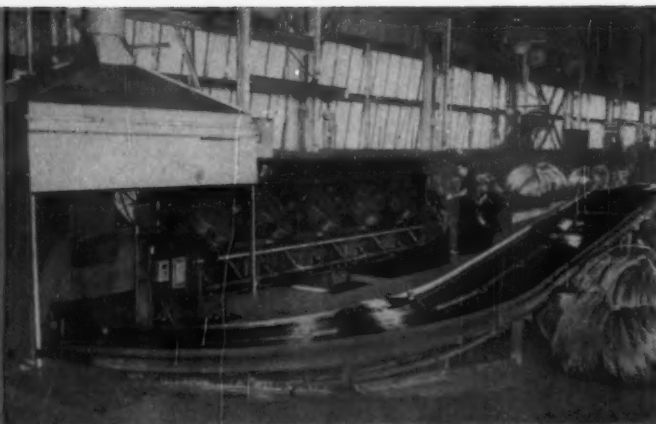
Rolling Mill Machinery



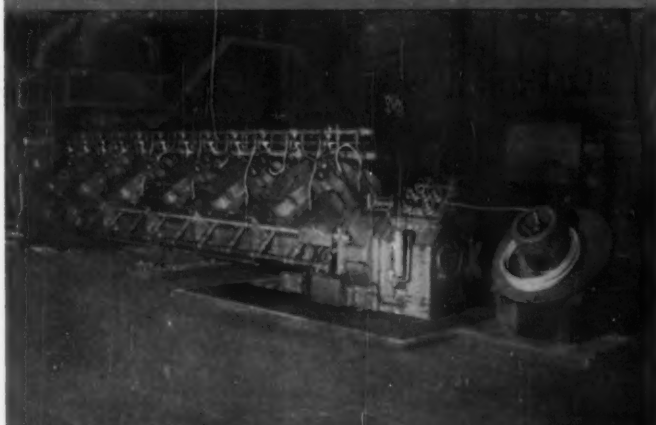
Wire Mill Equipment



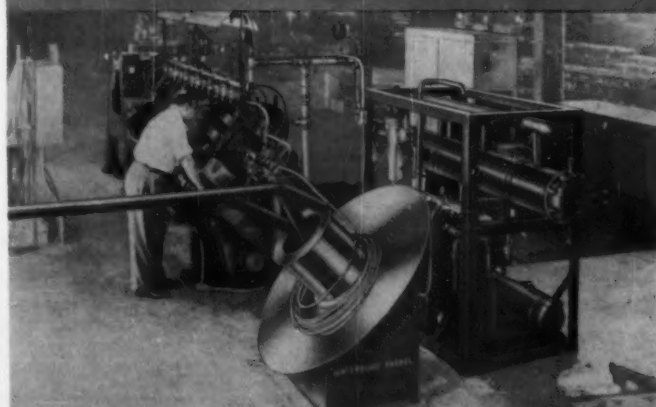
Sandzimir Mills and Other Special Machinery



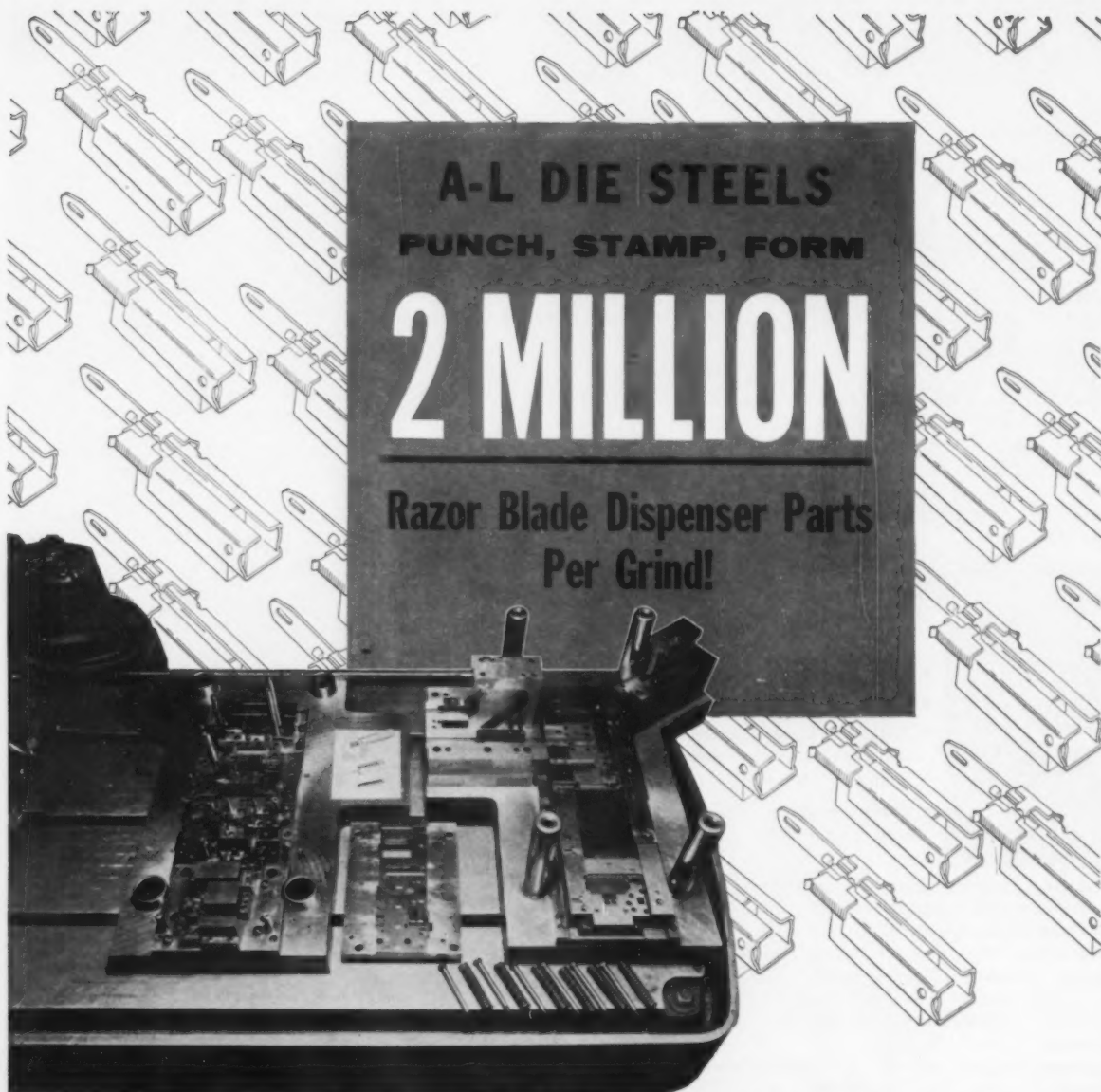
7" x 2" Ten Stand Tandem Rod Mill in operation for Anaconda American Brass Ltd. (Subsidiary of the American Brass Co.) New Toronto, Ontario, Canada. Starting size 25/32" round rod and finishing to .314" modified square at 250 feet per minute.



7" x 12" Twelve Stand Tandem Rod Mill installed in Bristol Brass Corp., Bristol, Conn. Starting size 3/4" round rod and finishing to 250" modified square at 400 feet per minute.



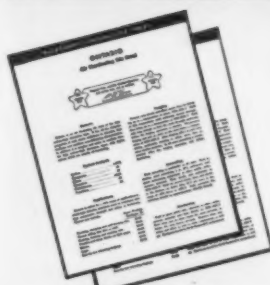
7" x 2" Ten Stand Tandem Rod Mill in operation at H. M. Harper Co., Morton Grove, Illinois. Starting size 9/16" round rod and finishing to .188" modified square in speed ranges from 85 to 253 feet per minute.



A-L DIE STEELS
PUNCH, STAMP, FORM

2 MILLION

Razor Blade Dispenser Parts
Per Grind!



Write for your

DEWARD & ONTARIO
BLUE SHEETS

These 4-page folders contain complete information on forging, annealing, tempering, etc., and detailed laboratory data on physical characteristics of A-L Deward and Ontario. Ask for your free copy.

Address Dept. A-4

Punching, stamping and forming parts of this die are of air-hardening Allegheny Ludlum ONTARIO—heat treated to 61-62 Rockwell C. Slides, frames and cams are of A-L DEWARD oil-hardening die steel—heat treated to 61-62 Rockwell C.

Ontario sections were pre-heated to 1250 F, then heated to 1850 F, held at 1850 F for about an hour and a half, then quenched in still air to room temperature. Finally they were drawn at 350 F for about three hours.

Deward sections (slides, frames and cams), were pre-heated to about 1200 F,

then raised to 1420 F. As soon as they were uniformly heated and equalized with the furnace temperature, they were quenched in warm oil. Sections were then tempered for two hours at 325 F.

Thus, two superior A-L steels combine to solve an intricate production problem. You, too, may have an application that will benefit from a better selection of tool or die steels. For complete information, call your nearest A-L distributor or representative today, or write Allegheny Ludlum Steel Corporation, Oliver Bldg., Pittsburgh, Pennsylvania.

For nearest representative, consult Yellow Section of your telephone book.

For complete **MODERN** Tooling, call
Allegheny Ludlum

WGW 9031



SIMONDS
ABRASIVE CO.

CUT-OFF WHEELS

for **FAST,**
CLEAN-CUTTING
on **ALL** materials

Resinoid bonded to stand up to the rigors of high-speed grinding! Rubber bonded for wet or dry cutting under severe-stress and strain! Simonds cut-off wheels, in either bond, save time, money and materials with speedy, accurate cutting. You can also eliminate finishing operations due to their clean-cutting action. All standard sizes. Drive pin holes furnished as required with rubber bonded wheels.

Write for bulletin
ESA 163.

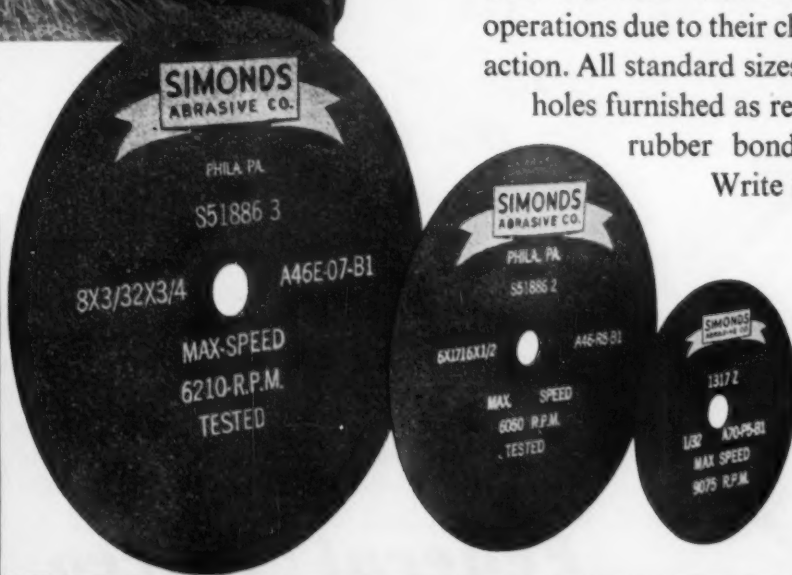
For all metals, including hard alloys, and non-metals except wood.



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NEW LOOK IN PRODUCTION LINES

From Material to Product in ONE PACKAGE

Need help to reduce your manufacturing costs and raise your production? Why not check Federal/Warco Packaged Production Lines — automated production from coil strip or sheet blanks to finished product.

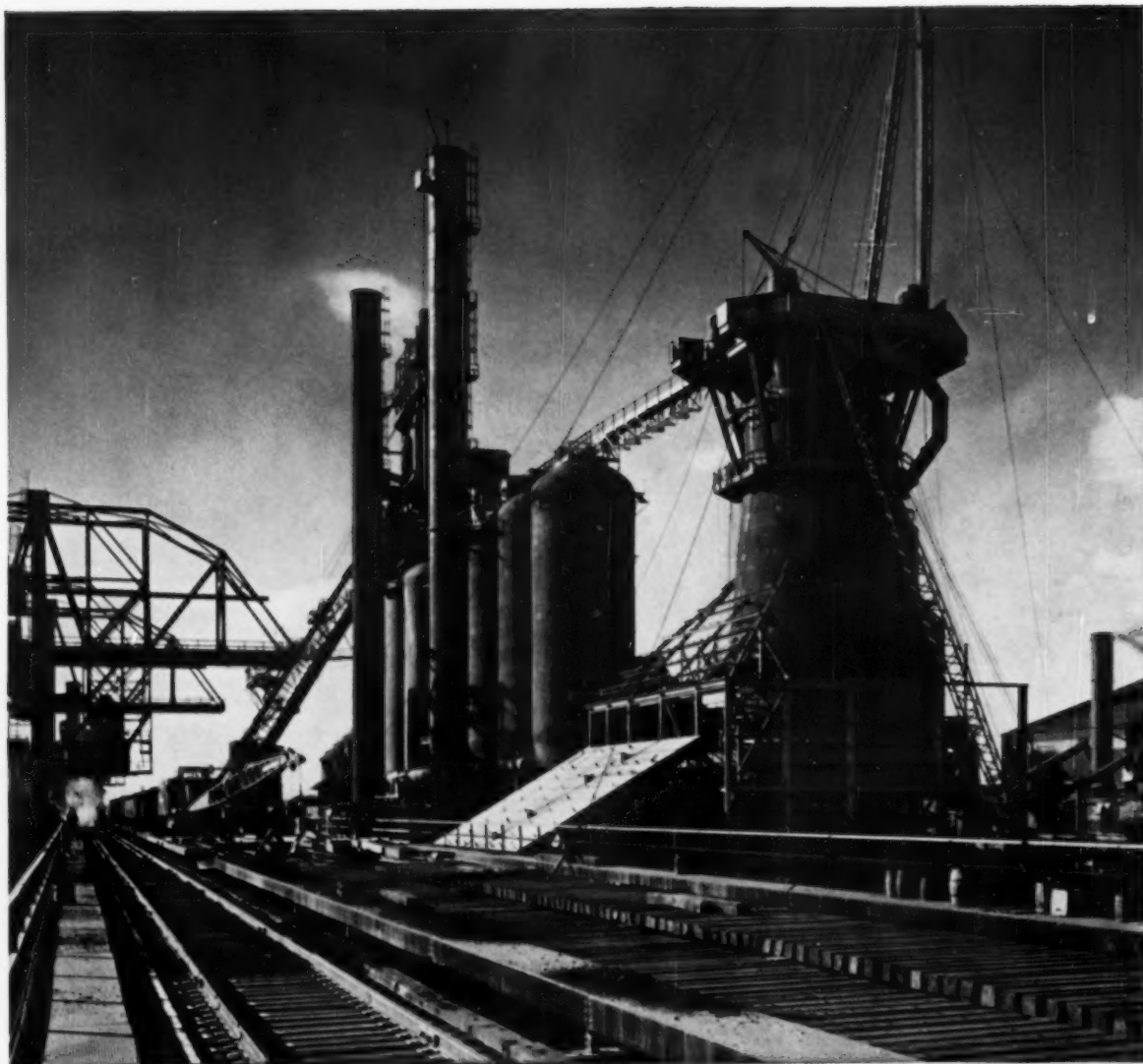
Only Federal can offer you actual single source responsibility with major line components of resistance welders, punch presses, mechanical welder presses, automatic arc welders, expanders, destackers, transfer equipment and digital control — all designed and built in Federal's plants.

Federal pioneered and are leading designers and builders of packaged lines. Talk with a Federal representative when next you're planning production welding or press equipment.

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PRODUCTION LINES

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AFFILIATED WITH BERKELEY-DAVIS, INC., DANVILLE, ILLINOIS, MANUFACTURERS OF AUTOMATIC ARC WELDING EQUIPMENT.



Under construction—Trenton, Michigan, Plant

McLouth Blast Furnace No. 2

The second major expansion in four years is nearing completion at McLouth Steel.

We are again adding to our facilities to bring you better steels for the product you make today . . . and the product you plan for tomorrow.

McLOUTH STEEL CORPORATION

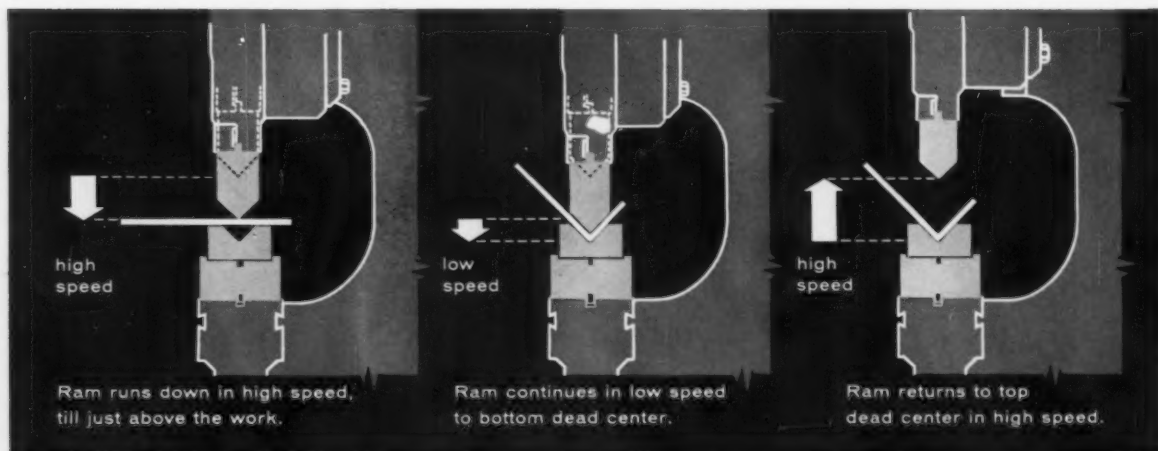
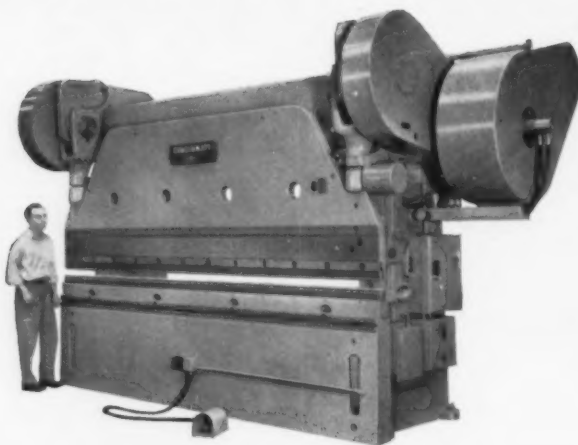
Detroit 17, Michigan

Manufacturers of high quality stainless and carbon steels.

10 to 60% increase in production makes

CINCINNATI AUTOCYCLE

the most important
press brake development
in years!



Cincinnati Autocycle is a brand new feature which automatically provides two speeds to the ram for each stroke. It eliminates the "whip-up" of a sheet's free end that occurs when light gauge metal is formed over a small die opening at high speed.

Unlike previous attempts at reducing whip-up, the Autocycle does not slow down the entire stroke of the press brake's ram. Nor does it require clutch slipping, which depends entirely on operator skill and at best is unreliable.

Think what these advantages can mean for you:

1. Actual job records show 10% to 60% increase in parts produced per hour.
2. You can set the length of the low-speed working

portion of the ram stroke. Once this is set, all strokes are identical, which insures absolute consistency in the work.

3. Work spoilage (such as back bends caused by whip-up) is eliminated.

4. Highly experienced operators are not required.

5. Operator fatigue is greatly reduced by eliminating clutch slipping.

6. Clutch and brake are long-life, minimum-maintenance units requiring no adjustments.

This productive new feature is available now on all 7 and 9 Series Cincinnati Press Brakes.

Get the full details about Cincinnati Autocycle in Bulletin B-9. Address your request to Department B.

Shapers / Shears / Press Brakes

THE **CINCINNATI**
SHAPER co.



Cincinnati 11, Ohio, U.S.A.



Photo courtesy of American Bridge Division, United States Steel Corporation

Handles bulky loads . . . outhauls 5 trucks!

The *Clark-Ross* Carrier pictured above hauls girders from a storage yard one mile away to this construction site. Working with another Carrier an average of 48 net tons are moved each hour. On these short runs, each Carrier is capable of outhauling 5 flat-bed trailer rigs. Reason is: the Carrier is *self-loading* and *self-unloading*.

How about a Clark Carrier for your work? One man and his Carrier can load up to 25 tons of material . . . can be on the road in the time it takes a regular truck to jockey into position. The Carrier

can travel at truck speeds . . . *self-unload*. And it can handle all types of cumbersome materials.

Reports from users point up the fact that once a Carrier is used in their operation, they find that *no other kind of materials handling equipment can do the job as economically*. Let us send you some reports from the field to substantiate this. Simply write: Carrier Field Report, Clark Equipment Co., Battle Creek, Mich.

CLARK[®]
EQUIPMENT

Clark-Ross is a trademark of Clark Equipment Company

2351

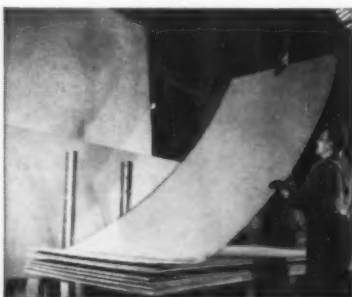
types, shapes, sizes and finishes of Allegheny stainless in stock at Ryerson

When you want stainless fast... anything from one to 2351 types, shapes, sizes and finishes... telephone Ryerson. You can

depend on accurate processing and quick shipment from Ryerson... the nation's oldest supplier of stainless from stock.



STAINLESS SHEETS—Eleven analyses of Allegheny stainless sheets, including nickel and straight chrome types. Extra wide sizes, also, to reduce welding costs. Expanded and perforated sheets.



STAINLESS PLATES—Nine analyses, including plates to Atomic Energy Commission requirements and to ASTM specifications for code work. Also extra low carbon types for trouble-free welding.



STAINLESS BARS AND ANGLES—Eight types, including rounds, squares, flats, hexagons and angles. Free-machining bars with both analysis and mechanical properties controlled for best performance.



STAINLESS PIPE AND TUBING—Light wall, standard and extra heavy pipe, ornamental and regular stainless tubing. Also screwed and welding fittings and Cooper stainless valves.



STAINLESS CIRCLES, RINGS, SPECIAL SHAPES—No matter how intricate, we can flame-cut practically any shape from stainless steel plate. One piece or a thousand.



TRUE-SQUARE ABRASIVE CUTTING—Stainless plates up to 12' x 25' cut absolutely square on abrasive disc machine. Length and width tolerance plus or minus 1/32".



RYERSON STEEL

Member of the  Steel Family

Principal products: Carbon, alloy and stainless steel—bars, structurals, plates, sheets, tubing—aluminum, industrial plastics, metalworking machinery, etc.

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • WALLINGFORD, CONN. • PHILADELPHIA • CHARLOTTE • CINCINNATI • CLEVELAND
DETROIT • PITTSBURGH • BUFFALO • INDIANAPOLIS • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

Press for Superalloys

Superalloys which can't be shaped by rolling or hammer forging are expected to yield to a special 1000-ton-capacity hydraulic unit. Just installed at a leading research center, it shapes metals by a combination of extrusion and press forging. It can also fabricate die materials which form thin alloy sections for aircraft use.

More Accurate Measuring

Look for news soon about measuring systems that break a degree of arc down into fractions of seconds. At least three new indexing systems and dividing tables have been developed. All attain greater precision than those formerly used in jet engine applications. One is said to be so accurate it will measure the circumference of a 24-in. diam circle in millionths of an inch.

Merchant Wire Pickup

Running well behind its normal starting date, the long awaited Spring pickup in merchant wire products is finally beginning. What it lacked in punctuality, the seasonal sales gain seems to be making up in vigor. Several wire producers report sharp increases in orders, with bookings placed for May and June delivery.

No Tough Labor Laws

Don't look for any important labor legislation in this election year. There might be some in 1959, but only if it's acceptable to AFL-CIO leaders. One reason: 170 Congressmen and 44 Senators now in office owe part if not all of their present status to union support. After the coming elections, the figures will be even higher.

Ferroalloy Markets Ease

The slump in steel demand is weakening some ferroalloy markets. The leading producer of ferro-columbium and ferro-tantalum-columbium posted new prices, warned they were only nominal and subject to quick change. A big factor in the

situation is the fall-off in demand for stabilized stainless steel grades, especially 347 and 348. The aircraft industry was a big user, but doesn't need so much these days.

Control AC Motor Speed

A new device claims to make it possible to operate AC motors with the speed flexibility of DC types. The unit is said to take power from a constant speed source and deliver it, without mechanical connections, at any preselected or variable speed. It is available in six sizes for use with AC motors ranging up to 150 hp and 1750 rpm.

Busy Summer Ahead?

Don't count on a vacation slowdown this July. Many metalworking firms are taking advantage of slack conditions in the first half to clear up vacations, take inventories, and overhaul equipment. If the looked-for pickup starts in May and June, it could gain momentum right through the summer.

Few New Navy Missiles

Most of the missile business by volume is in workhorse, non-ballistic types — ground-to-air, air-to-air, and air-to-ground. The Navy now buys 14 such items and expects to add very few new ones to the current list. "We can no longer afford to go into brand-new missile programs," one officer says. Emphasis from here on will be on improvement of existing types.

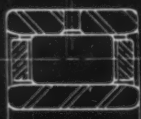
Step Up Metals Research

Military-sponsored research push is on to develop: (1) new high-strength and heat resistant metals for planes and missiles; (2) better machine tools to form the metals quickly and economically. Emphasis on steels and molybdenum-base materials has replaced the previous titanium development program.

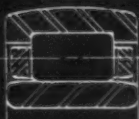
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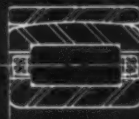
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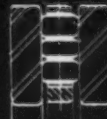
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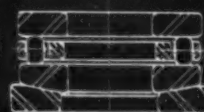
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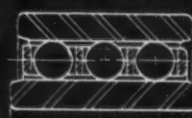
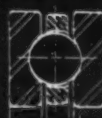
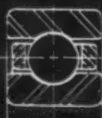
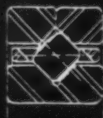
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Shipping by Air Freight Can Save More Than Time

Air freight means more than deciding if speed is worth the extra freight costs.

Savings can be found in packaging, lower inventory costs and in many less tangible cost reductions.—By T. M. Rohan.

■ Air freight is starting to elbow its way out of the "premium" class for quite a few metalworking plants.

Although far short of some of glowing prophecies of a few years

ago, tonnage continues to grow annually. Newer and bigger planes, regular schedules and a belated promotion effort are fitting it into regular distribution channels. Metalworking companies are finding that there is far more to the story than simply comparing air and surface rates and deciding if the rush is worth the extra expense.

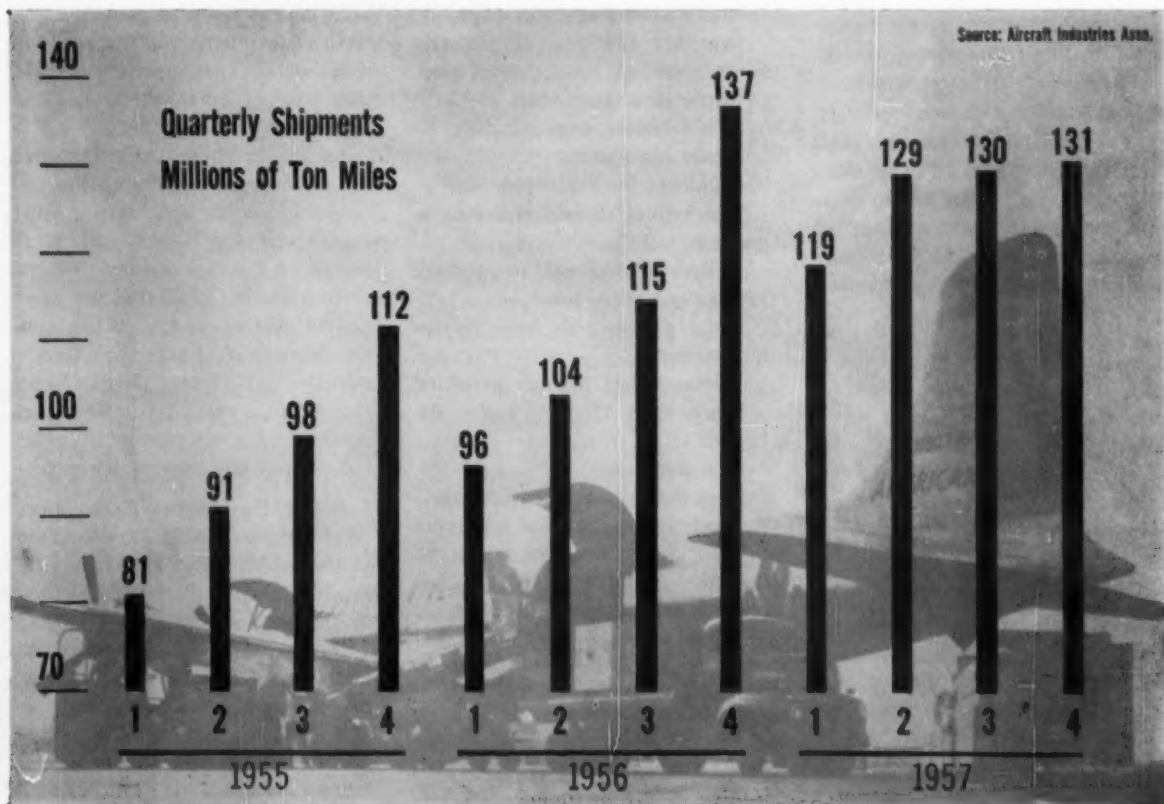
More Than Time — Now some companies are reviewing their whole distribution picture and finding air

freight can save far more than time. Even in the recession and at 4 times rail costs, it is being used to bring in orders sooner, plug inventory holes, eliminate warehousing and speed up defense development.

A West Coast airplane company is saving \$750,000, largely in lower packaging costs, by flying new jet engines out from Connecticut.

An auto manufacturer runs California assembly plants on 1 1/10 days inventory because it can fill holes in the pipeline with overnight

Air Freight Growth: It Thrives on Business Peaks





HALF A LOAD: Latest equipment like this Flying Tiger Line Constellation has replaced old planes of air

freight's infancy. Foreground shows half a load to be handled in one high speed flight.

air freight from Cleveland to California.

A drill manufacturer sends drills overnight to California warehouses and distributors rather than try and carry local stocks.

Electronic brains go by air because leasing fees come in sooner, vibration is less and no special packing is necessary.

A Cleveland instrument plant finds it well worth while to shoot \$25 on an air freight bill to get a pilot model into a customer's hands overnight and get a \$500,000 production order back 5 days sooner.

Overseas, Too—In overseas operations, some areas get 90 pct of their retail commodities by air. On inland explorations in South America, American companies have used air freight for years. They found trains climbed the mountains so slow, natives could walk alongside and steal the freight.

One traffic manager said:

"Any traffic manager would make a serious mistake if he stopped in his investigation with a mere comparison of air and surface rates per 100 lb. The pot of gold will be found in weight and packing cost reductions."

Where Savings Lie — Greatest areas of savings are in more or less intangible areas, which is one reason airlines have such a tough sell. The figures and situation are different with each company and most are reluctant to let them out.

Some of the general potential areas of savings by air freight are:

Lower packaging costs.

Less vibration damage.

Lower insurance.

Eliminate local warehousing.

Less capital investment tied up in goods in transit.

Deliver pilot models to get back production order sooner.

Raise profits with faster inventory turnover.

Eliminate late delivery penalties.

More sales through better delivery.

Less pilferage.

Less obsolescence and spoilage.

Air freight business is not about to push the railroads or trucks off the map. Total air freight haul is only about 1/20th of 1 pct of the tonnage carried by other forms. Yet it has increased almost 1400 pct in 10 years.

Growth Rate—Last year the industry had its best year in history, topping the half billion ton-mile

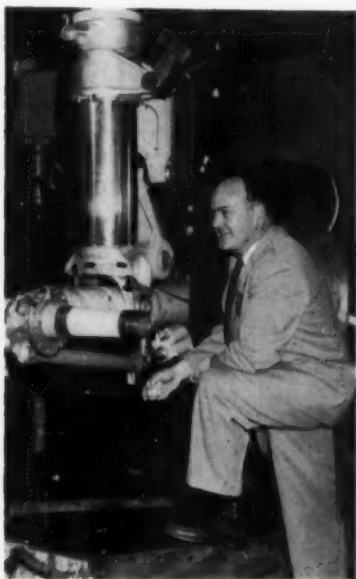
mark for the first time with 507.6 million ton-miles of freight. In 1956 it hit 451.1 and in 1955 it carried 383.1 million ton-miles.

Even with the recession this year, airmen expect to register almost the same gain as last year. This will put them at about the 550 million ton-miles mark. Two lines have discontinued scheduled freight service but do charter work.

Largest machinery shipping center is Cleveland where 90 pct of the outgoing freight is in auto stampings, machinery parts and electronics. Total outgoing freight there is about 11,000 tons per year. United Airlines is the leading carrier from there. Largest carrier nationally is Flying Tiger Line. United some years ago inaugurated its reserved space plan which gives top priority and assures delivery.

Latest Equipment—New equipment being used is a far cry from the C-46s which flew The Hump in World War II and later planes used in the Berlin Airlift. The Flying Tigers are the leading all-cargo line and, with Seaboard and Western, operate the biggest equipment.

The Tigers have a \$28 million fleet of 12 Lockheed Super Constellations which will lift 21.5 tons each



FAST: Aircraft landing gear is regularly sent by air from Cleveland Pneumatic Tool Co. to Boeing.

and fly at 331 mph maximum. These give overnight service from eastern cities to the West Coast and are supplied by feeder lines from smaller towns. These leave Cleveland at 2 a.m. daily, for example, and land in Los Angeles at 10:30 a.m. And new all-jet cargo planes on order will carry 35 tons. The most widely used DC 6A, introduced in 1951, will leave New York at 10:30 p.m. with 16 tons of freight and land in Los Angeles at 6:30 a.m.

Boeing's new Boeing 707, the first U. S. commercial jet transport, will get over 600 engines from all the way across the country at Pratt & Whitney, East Hartford, Conn.

In looking into this logistics problem Boeing uncovered a cost saving of about \$750,000, largely through less expensive packaging and fewer units. The special protective can required for rail shipment weighs 3780 lb and costs \$1200. A simple Boeing-designed "buck" for air shipment weighs 734 lb and costs \$600. In addition, shipment will be overnight, permitting closer scheduling.

Auto Parts—Ford Motor Co. is able to run its West Coast assembly

plants on 1 1/10th day inventory because it can fall back on air freight to fill in the gaps. Without it, the company would obviously be less inclined to cut it that thin because costs of stopping a line for lack of parts are astronomical.

At the height of the auto boom in 1955, cargo planes were chartered and ran between Detroit and the Coast. Plane loads of axles and body parts went out in shuttle.

From Cleveland, auto parts from all producers went into 25,000 lb daily for one carrier alone.

In the current slow market, air freight is used more sparingly by auto firms. But if production schedules change, a vendor misses delivery dates or strikes disrupt schedules, air freight is used.

From Cleveland to the Los Angeles area, freight on auto parts is down to \$18.75 per cwt on a 30,000 lb rate. By rail it ranges from \$2.82 to \$3.32.

Drills Rushed—Trying to keep two West Coast warehouses supplied with drills that come in 16,000 sizes and varieties has put Cleveland Twist Drill Co. in the air freight business. To aircraft firms, the cost of a drill, reamer, countersink or tool bit is insignificant compared to the loss in business and scheduling if a deadline is missed. So almost all orders are rush.

Cleveland Twist Drill ships drills daily overnight from Cleveland to its warehouses and distributors in San Francisco and Los Angeles. Occasionally they are routed directly to the customer. Costs run about \$20-21 per cwt for the overnight air service including pick-up and delivery compared to \$5 for 8-10 day rail service through freight forwarders. Drills range widely in price from 50-60 cents for common grades to \$300. Occasionally none of the 16,000 will do. The aircraft firms design their own drills to be made on special order and these go by air too.

More Case Histories—Another Cleveland company picked up at least a month's time and speeded national defense by using air freight.

Jack & Heintz of Cleveland was developing a special screw shaft in cooperation with a west coast subcontractor. It was necessary that the shaft make three round trips for adjustment and revision before the final version was worked out. Overnight air freight was used at a saving of at least 5 days per trip.

Pesco Products Co. of Cleveland also is using air freight extensively in setting up a new Florida missiles service center.

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Eggs and Apples

There's quite a difference between eggs and apples.

William A. Cook, vice president of Barium Steel Corp., and a reluctant Government witness in the Justice Department's fight against the proposed merger of Bethlehem Steel Corp., and Youngstown Sheet & Tube Corp., was talking about "eggs" — Barium's proposed new Eastern plant — when he testified last week. He was not, Mr. Cook said this week, talking about "apples", or the type of plant that Bethlehem says would cost \$300 per ton to build.

Mr. Cook, who was drafted by the Government to testify as a Government witness, told the New York District Court that engineering studies on the cost of the proposed Barium mill add up to \$146 to \$178 per ton. But the Barium plant, he points out, would be "considerably different" from a plant that Bethlehem or any other steel company might propose to build. For one thing, he says, the range of products at the Barium mill would be limited and the cost would be in no way comparable to the cost of a steel plant with a wide variety of products, or for example, ore properties.

Behind Armco-National Merger

Move Dovetails Balance With Sources of Supply

Merger will put Armco into fourth position in the industry in earnings.

It will balance out Armco's products and provide a assured steel source for National Supply's pipe production.

■ Add National Supply Co. to Armco Steel Corp. and you have a billion dollar steel mill. And that's what's about to happen.

Stockholder approval last week paved the way for the merger of National Supply into Armco on April 30. Combined sales of the two companies have topped \$1 billion for each of the past two years.

Up to No. 4—On this basis, Armco will jump to the number four position in earnings in the steel industry. The gain could stir restless feelings among the other mills. It could speed new thinking on the compatibility of specialty products with tonnage operations.

Immediate effects of the merger include:



National Supply's A. W. McKinney



Armco's R. L. Gray

1. It puts Armco in the pipe business.

2. It gives National Supply an assured source of semifinished steel.

3. It raises speculation on new steelmaking capacity and new seamless mills for the combine. These effects explain why the companies wanted to merge and why they were able to. Each had what the other wanted. Product lines dovetailed cleanly, with no overlapping of markets.

Provides Balance—Armco had grown to the number seven position among basic producers, largely on the strength of flat-rolled products. It has hot-rolling capacity for 4 million tons, over 3 million tons of this is in sheets or plates.

Within the sheet field Armco is widely diversified but it has lacked overall balance. It is one of the few major mills without an important tubular line. This gap seemed particularly large last year when sales of oil country seamless boomed and sheet orders slumped.

National Supply offered a natural

answer to the problem. Lying only a short barge haul from Armco's Ashland, Ky., plant, it has 700,000 tons of seamless and welded pipe capacity. It offered a profitable, strongly maintained operation, complete with distribution lines in this country and abroad.

For National—For National Supply, President A. W. McKinney cited merger benefits of added profit, assured supply and greater stability. Like Armco, National Supply has operated with a large gap in its makeup. It has no steelmaking capacity. Integrated mills supply billets and blooms needed by its pipe mills.

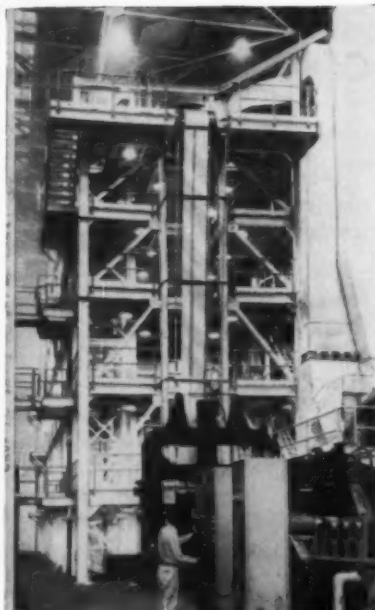
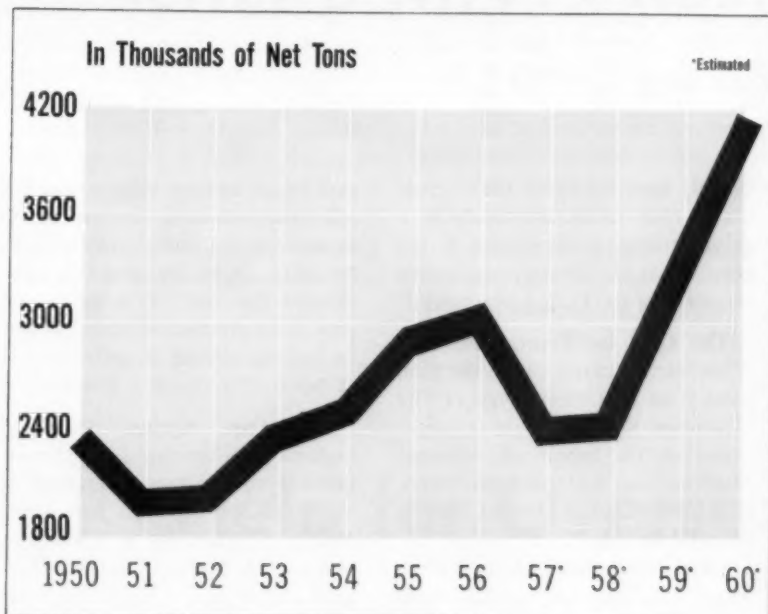
From a cost standpoint, National Supply has had the disadvantage of paying market prices for steel that was available at cost to its competitors. Elimination of this differential by the merger will mean added profit.

From a supply viewpoint, the company was even more vulnerable. It needed more seamless capacity to balance out its oil field line, but was reluctant to spend \$10-\$15 million for a mill without firm assurance that added steel would be available. It was never sufficiently reassured on this score.

Greater Stability—Finally, National Supply relies very heavily on the oil field market. When drilling rates dropped this year, the company's sales fell 35 pct. Mr. McKinney feels the merger will promote stability by making the company part of a broader organization.

All these reasons made sense to stockholders of both companies. By big majorities, they approved the union on the basis of 85 Armco common shares for 100 National Supply common shares.

Galvanized Sheets: Growing Market For Zinc



Lead-Zinc Hitch Star to Research

Industries hope research and developments will broaden markets, increase sales.

Closer cooperation with user industries, more outlays for sales and promotion urged.

Major U. S. producers of lead and zinc met last week in St. Louis under several clouds: (1) There could be no talk of tariffs; (2) both metals are overproduced; and (3) the government stockpile situation is again indefinite.

Still, zinc producers were hopeful that a Battelle research program on plating of zinc diecastings might be the answer to their problem in Detroit. Results on the program are not yet definite, but it is hoped that they will be proved out in time to make zinc diecastings definitely competitive in time for the 1960 model year.

Mount Research Program—On

stockpiling, feelings are mixed. Some zinc producers hope that stockpiling will stop. Privately, others say that if it is not resumed, there will have to be sharp production curtailments.

For the long term, the industry will start a major research program to develop new products and uses for lead and zinc. It will be supported by major producers throughout the world.

Better Mousetrap Needed—Research, said the institute's president, S. D. Strauss, will "provide the better mousetrap but it will take more vigorous promotion and sales to get customers to beat a path to our door."

Mr. Strauss, who is vice president, American Smelting & Refining Co., argued that "if we are going to widen our markets, we are going to have to tell our story to the men who specify, design and produce the products we are selling . . . we're

spending less than any other major industry on sales and advertising. Perhaps we should put more into making information available and forcibly presenting it to engineers, designers, architects and production people."

Galvanized Outlook — Ralph C. Miller, Jr., assistant manager, Sheet Mill Products Div., Jones & Laughlin Steel Corp., was optimistic on both the immediate and long-term outlook for galvanized sheets, one of zinc's biggest markets.

On the basis of projected levels of industrial production, construction, and agricultural activity, the speaker foresaw a rise in galvanized sheet shipments by 1960 to 3.3 million tons, or 23.4 pct more than the average of shipments in the last two years. Galvanized shipments in 1965, he said, could be as much as 4.1 million tons.

"Buy American" With a Twist

Can You Make Overseas and Sell U.S.?

More American firms are exploring advantages of making products in foreign plants.

"If you can't lick 'em, join 'em", runs the thinking of some firms.—By G. G. Carr.

■ Can American labor really price itself out of the market in basic industries? Does metalworking management have any choice beyond ponying up for ever-climbing payrolls? Are the benefits of low foreign wage scales restricted to foreign manufacturers?

Until recently, most executives would have answered these questions with a positive "of course." Today, the answer is more likely to be a thoughtful "maybe not."

Largely overlooked in the current hassle over protective tariffs is a quiet perking-up of interest in the possibilities of offshore manufacture of goods for the U. S. home market.

The Case for Foreign Plants—

A succinct summary of the situation came from J. Herbert Myers of The Cincinnati Shaper Co. in a recent statement on behalf of National Machine Tool Builders Assn. before the House Ways & Means Committee. Said Mr. Myers:

"Some U. S. (machine tool) companies with operations abroad have been reluctantly considering the much more serious step of exporting a part of their foreign production back into the U. S. market. The pressure of increased foreign com-

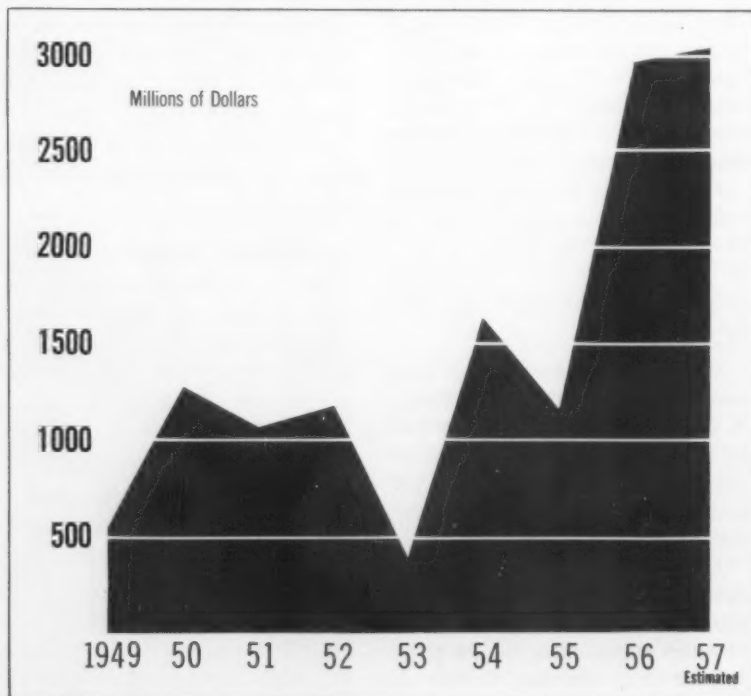
petition is forcing such a step for self-preservation. No responsible member of the industry views with anything but apprehension the thought that one day a substantial part of his production facilities must be located abroad in order to sell at home. Yet this is a possibility."

The Case Against—The tool builders estimate that foreign competitors enjoy a cost differential of about 50 pct through low labor costs. But producers in other lines disagree. A leading industrial furnace maker tells *The IRON AGE* that his company finds its production costs are still lower in the U. S. than in its foreign plants, despite lower labor rates overseas. "They haven't got the production equipment, so they pile on the man-hours," he explains. "We only manufacture overseas because of dollar shortages, import curbs, and that sort of thing." Other manufacturers point to high material costs in foreign countries.

Nature of the product is an important consideration. General Motors' Frigidiare Div. finds it is substantially cheaper to produce refrigerators in Dayton, Ohio than in Gennevilliers, France. Material costs are a big factor, but volume is the main reason. Dayton production runs are far higher, explains GM, and this permits use of heavier equipment with higher output.

Automotive Picture—Automotive production data is elusive, primarily because overseas auto plants are turning out essentially different kinds of cars under different circumstances for different markets. But what evidence there is available all suggests that the more nearly identical with Detroit a foreign auto plant can become, the better off it is. Hand-tooled jobs for the sports-car set are a different matter.

U. S. Investors Have Big Stake Abroad



Source: U. S. Dept. of Commerce

Overseas manufacture for foreign markets is by no means new, although an increasing number of American firms are turning to it, as much to bypass trade and political restrictions as to benefit from lower labor costs. But offshore manufacture for the U. S. market has in the past generally been restricted to luxury or specialty items for which small American demand did not justify domestic high-volume production.

A "One-World" Concept — Today, large companies as well as small are investigating foreign production designed specifically for the U. S. market. Lafayette Brass Manufacturing Co., New York, has built up a \$6 million annual business in lawn sprinklers and garden accessories made in Japan and Italy from brass bought in Germany.

Lafayette president Norman Redlich is a firm believer in his One-World manufacturing concept. "The

time is rapidly approaching," he argues, "when a small manufacturer can subcontract production or manufacture almost any place in the world as easily as he does in the United States."

Benefits and Pitfalls — Biggest benefit, Redlich finds, is low-cost labor. Schooling foreign labor to American design and quality concepts is a major headache, but one that pays off in a 30 to 50 pct cost saving.

Help for Overseas Investors

Washington agency will share the risk if the proposition is sound.

Manufacturing, mining, and processing projects have inside track.—By R. M. Stroupe.

■ Is your company thinking of investing in a mining concern in Venezuela? Or a farm machinery plant in New Zealand? Or a firm manufacturing metal office furniture in India?

You may want to share the cost of investment in one of these or in some similar enterprise. You'd like the use of additional capital for, say, 10 to 12 years. And you prefer that your coinvestor take a secondary position when it comes time for repayment.

Where to Go—Under these conditions, you may want to talk over your proposed investment with the International Finance Corp. It's a Washington agency, but with more than 50 shareholding member nations. IFC puts money into private firms abroad that offer good prospects for expansion.

The corporation doesn't initiate the projects it invests in. It considers and acts on proposals made to it by private business firms that are expanding their activities. Some

U. S. machine tool companies and metals fabricators have come in with ideas for investment.

Olin Mathieson Project—These haven't yet resulted in a joint venture by IFC and the companies. Of the first half-dozen projects in which IFC takes part, only one so far is in cooperation with a U. S. industry, Olin Mathieson International. But more are in the works as the agency studies dozens of opportunities offered to it.

How IFC and an American firm can work together in a investment action is illustrated by the Olin-Mathieson project. This Brazilian enterprise is Olinkraft, a kraft pulp and paper subsidiary. As the sponsor, the U. S. company first bought a pulp and paper mill, a hydroelectric powerplant, and pine timberland.

How IFC Shared—This year the firm will put in new equipment to permit an output of some 35 tons daily of unbleached kraft pulp, paper, and liner board. Capacity will be expanded to 80 tons per day at a later time.

Amount of the IFC investment in an enterprise seldom exceeds \$2 million. In Olinkraft, IFC is putting up \$1.2 million, compared to the Olin-Mathieson equity holding of

\$2.2 million. An additional \$1 million consists of a loan from Brazilian sources.

Manufacturing Preferred—IFC has about \$93 million, subscribed by its members, to use in investments. The agency intends to place its funds in limited sums, covering no more than half the total cost of an enterprise. For the best chances of realizing a favorable return for its money, IFC prefers manufacturing, mining, and processing projects.

The firm with an attractive venture in its sights can get from this agency a business-type deal for investment-type money, IFC President Robert L. Garner tells *The IRON AGE*. IFC is not a lending office, and its money isn't cheap. Interest rates on the funds put into its initial projects run to 6 and 7 pct.

It's a Long Wait—On these projects, however, IFC is waiting 9 to 15 years to get its money out. This fairly long term for maturity allows time for the enterprise to prove itself. When IFC is ready to sell its interests, the principals will have the right of first refusal to buy.

At least half the inquiries reaching IFC as to new projects concern Latin American businesses. Mr. Garner reveals.

Computers Move into Planning

Mathematical Analysis Proves Out in Tests

Operations research is getting a strong foothold in steel industry planning.

Still largely experimental, some applications are being made in actual operations. Others are laying groundwork for future.—By G. J. McManus.

■ Management by the numbers is catching on in the steel industry.

The mills are piling more and more functions on numbers. They are adding and subtracting these numbers to come up with decisions on ore development, scrap buying, roll replacement, warehouse inventories and others.

This activity goes by different names: Applied mathematics; industrial engineering; operations research. It is closely tied to computers but goes beyond the high speed storage and sorting of data. The new concept aims at relating figures in a way that provides a

positive, best answer to problems.

Coming of Age—In this sense, steel is still on the experimental fringe of mathematical management. However, there have been practical applications and the groundwork is being laid for a lot more. At Pittsburgh Steel Co., linear programming has been applied to problems of blast furnace burdens.

Jones & Laughlin Steel Corp. has applied operations analysis to ore prospecting, scrap allocation and other functions.

Crucible Steel is keeping a running check on warehouse inventories by means of a computer. Republic Steel is working with Case Institute of Technology on a digital computer program. Lukens Steel has a formally designated operations research group.

Potential Disclosed — Probably the most extensive activity in the general area has been at United States Steel. A glimpse at the Cor-

poration's program was afforded recently at a meeting of the Pittsburgh Chapter of the Society for Advancement of Management.

At the session, U. S. Steel's basic standards system was explained by R. V. Flint, chief industrial engineer, basic standards. He defined a basic standard as a "quantitative allowance for carrying out a defined activity." All equipment is rated for specified production per hour. All operations are rated for a certain number of manhours.

Management Guides—This idea is not new but the scope of U. S. Steel's basic standards system is unique, in the steel industry at least. The corporation has for years set standards on every activity from ore mining to finished product shipment.

With dollar values attached, the standards have been used to set product costs, establish budgets and measure performance. Today, they are finding increased use as guides in management planning, particularly in the field of raw materials and facilities.

Ready to Go—This type of guidance at U. S. Steel has involved some very complex data correlations. One correlation for blast furnaces required more than a million calculations. But the Corporation has not indicated that it has made any practical application of linear programming or other operations research optimizing techniques.

It has certainly acquired the experience and the data to do so. This fact was noted at the same SAM session by Carnegie Tech's W. W. Cooper, who has worked with steel mills, oil producers and others on operations research. Professor Cooper went on to say there is feverish activity in the management science field and that companies



BY THE NUMBER: Electronic computer at Crucible Steel Co. of America maintains centralized inventory control over 16,000 items in warehouse system. Mathematical analysis is a growing trend in the industry.

would do well to equip themselves for the breakthroughs that are coming.

In any case, the mills have started to build up data and play with it. They have the computers to handle great bundles of arithmetic with electronic speed. They are growing more interested in an integrated approach to cost problems.

Use Potential—At one mill today a study is being made of replacement rolls. How many should an individual line carry? A reasonable answer has always seemed that the line supervisor should decide on the minimum level of replacement stock to assure smooth handling of his workload.

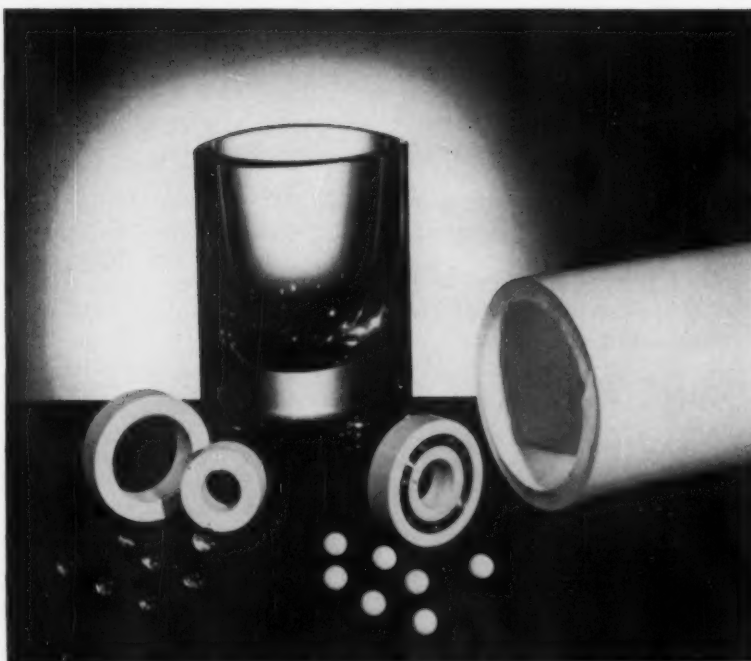
Now this answer is being questioned. Is the best decision for an individual department the best for the whole company? Would it be better to let efficiency lag in one area and put money into a more profitable operation? This type of overall evaluation automatically puts you into higher mathematics and that's where the mills are going.

Successes and Failures—All this may sound like doubletalk and there have been some dismal failures of the new techniques. But there have also been some real successes.

At one steel mill today, a computer is advising distribution branches when and how much they should order. The branch makes the actual decision; the computer only recommends.

At one company last year, a mathematical principle of inventory control was cranked into a computer. The machine competed against the company's management in predicting what inventory levels would be needed.

When the test period was completed and results were checked, it turned out the computer consistently came up with better decisions than management. The test was re-run on the same inventory situations, but this time management was given the sales figures in advance. The computer worked blind. Management again came out second best.



WHEN THE HEAT IS ON: Ball bearings and pistons made of Pyroceram, a new crystalline material developed by Corning Glass Works, were on display at the Design Engineering Show. Shown in both pre- and post-heat treat stages, they are under test for use in high temperature applications.

New Materials Debut At Design Show

■ The designer's job isn't getting any easier. The growing range of new materials helps him do a better job. But properly evaluating them keeps him busy.

The designers who walked the aisles at the ASME Design Engineering show in Chicago last week saw plenty to think about. Here's what was on display:

A new nickel coated steel sheet, available in 24 x 96 in. cut sheets or lengths up to 160 in. and in continuous coil in 1/8 in. to 24 in. widths. While pre-plated finishes in chrome, nickel, and copper have been marketed previously, this new C-grade is aimed at the lower price market.

High Temperature Help—Titanium producers—aiming at highly corrosive chemical applications—showed a test specimen that's withstood 2000 hours in a high temperature nitric acid bath. The metal is offered for use in cable wire, as mesh screens for filtering of corrosive liquids, and for high temperature chemical processing.

New materials from the plastics and ceramics industries were also represented at the show. Plastics producers displayed a wood veneer in micro thicknesses with a plastic surface and adhesive backing.

In ceramics, a lithium-aluminum silicate coming on the market doesn't expand up to 1830°F.

Founders Set Stage for Pay Talks

Release of National Wage Survey Is Opening Gun

This will be a stiff bargaining year for the nation's foundries.

Geographical wage differentials will be a big bone of contention.—By K. W. Bennett.

■ With release of the largest foundry wage study to date, National Foundry Association this week rolled up the 1958 wage bargaining curtain. Announcement by NFA of average wages in the industry provides the first concrete

data that can be used in establishing foundry wage offers. And '58 looks like a stiff bargaining year.

In a mammoth sample covering 30 pct of the nation's foundries and 50 pct of U. S. foundry employees, NFA has learned that only 65 pct of the shops will negotiate with labor unions. The figure is substantially lower than earlier estimates, and lower than the percentage of union organized shops in all fields of metalworking.

National Average Wage — As

negotiations begin, the national average hourly wage is \$2.03 for iron and malleable foundry workers. Steel foundry workers average \$2.23; and nonferrous foundry shops pay an average \$2.12.

Based on NFA's sample, 29 pct of the unionized foundries will bargain with the International Molders' & Foundryworkers Union. At least 13 pct will bargain with USW and 10 pct with UAW.

The Big Issues—Despite a strong USW push in the other direction, geographical wage differentials continue to be an important factor in planned negotiations. Detroit's foundry wages are the nation's highest, at an average \$2.47 per hour. Pittsburgh follows at \$2.35. In descending order, other important areas are San Francisco at \$2.34; Chicago-Saginaw, \$2.28; Buffalo, \$2.27; Lancaster-York, \$2.25; Cleveland, \$2.23; and Milwaukee, \$2.19.

An additional day of paid vacation will probably be an important bargaining point, although 45 pct of NFA's survey sample already allow seven days. Additional benefits being sought by unions in the early negotiations include increased sickness and accident insurance, protected vacation pay.

Pattern To Date—Of the sprinkling of wage settlements reached this year, the average wage offer by management has been a 6 cent per hour basic wage increase. Yet the average of increased wages is only 5 cents. The difference is caused by a number of foundries which have accepted strikes rather than make wage increases of any type. This is about twice the difference between wage increases granted and wage offers made in the rest of U. S. industry this year. In at least one settlement the union agreed not to demand a wage increase, but to wait until business improved.

How Foundry Workers Rate in Pay

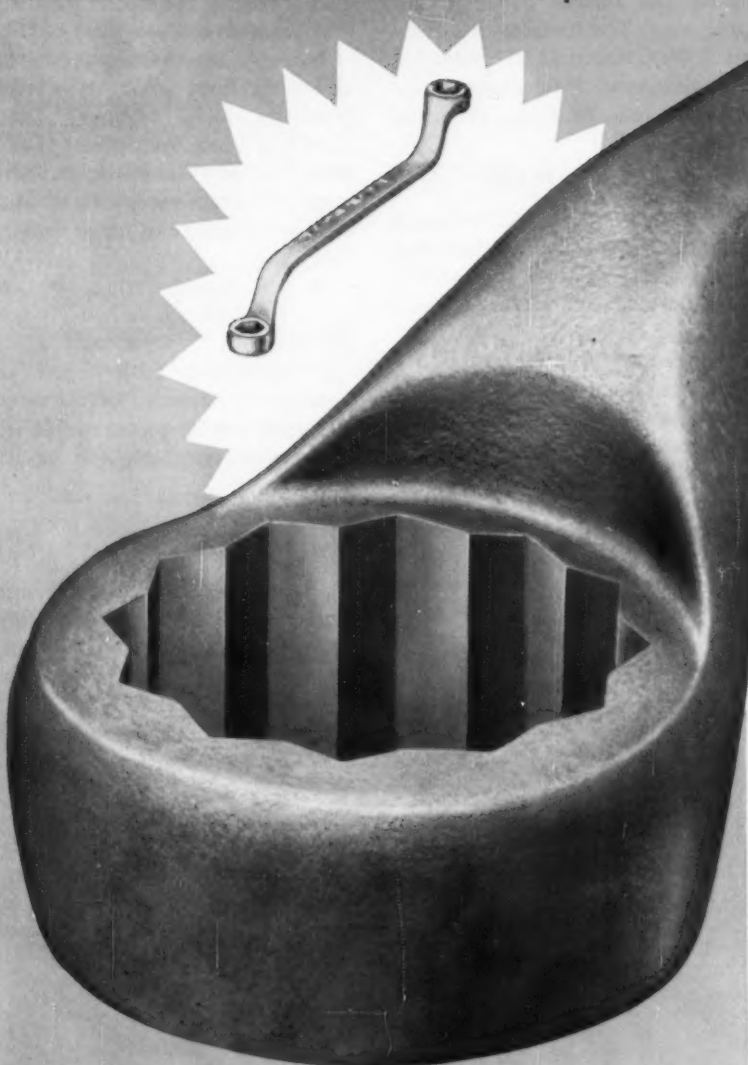
AVERAGE HOURLY EARNINGS

| Job Classifications | Gray Iron and Malleable | Steel | Non-Ferrous |
|----------------------|-------------------------|--------|-------------|
| Patternmaker, Wood | \$2.82 | \$3.10 | \$3.05 |
| Floor Molder | 2.32 | 2.42 | 2.37 |
| Bench Molder | 2.22 | 2.42 | 2.27 |
| Rollover Mach Mldr | 2.27 | 2.22 | 2.30 |
| Squeezer Molder | 2.22 | 2.32 | 2.32 |
| Sand Slinger Opr | 2.17 | 2.27 | 1.92 |
| Shell Machine Opr | 2.22 | 2.17 | 2.07 |
| Floor Coremaker | 2.32 | 2.47 | 2.37 |
| Bench Coremaker | 2.17 | 2.27 | 2.22 |
| Machine Coremaker | 2.17 | 2.17 | 2.07 |
| Core Assm and Fin | 1.97 | 2.12 | 1.87 |
| Cupola Tender | 2.02 | 2.52 | 2.02 |
| Elec Furnace Tdr | 2.12 | 2.37 | 2.22 |
| Melt Dept Lbr | 1.87 | 1.92 | 1.92 |
| Pourer | 2.02 | 2.17 | 2.02 |
| Shakeout | 1.87 | 2.02 | 1.82 |
| Blast Clearer, Room | 1.97 | 2.17 | 2.02 |
| Blast Cleaner, Mach | 1.87 | 1.97 | 1.87 |
| Grinder | 1.77 | 2.05 | 1.87 |
| Chipper and Finisher | 1.87 | 2.12 | 1.92 |
| Welder, Gas or Elec | 2.32 | 2.27 | 2.47 |
| Crane Operator | 2.12 | 2.27 | 2.22 |
| General Laborer | 1.77 | 1.87 | 1.82 |
| Inspector | 2.02 | 2.32 | 2.02 |
| Electrician, Main | 2.47 | 2.47 | 2.62 |
| Maintenance Man | 2.32 | 2.37 | 2.47 |
| Average | 2.03 | 2.23 | 2.12 |

Source: National Foundry Assn.

From Midget to Monster

WILLIAMS WRENCHES *fit the job**



In scale comparative illustration — Actual openings: Midget $\frac{3}{16}$ ", Monster $3\frac{1}{4}$ ".

***Over 95% of your wrench requirements are stock items in THE BROADEST LINE OF ITS KIND.**

WILLIAMS
DROP
FORGED

TOOLS OF INDUSTRY

ALLOY WRENCHES



A complete selection from 33 patterns, 400 sizes with openings from $\frac{3}{16}$ " to $3\frac{1}{8}$ ". Drop-forged from selected alloy steel and heat-treated for maximum service. Quality chrome plated finish.

CARBON WRENCHES



From a tiny $2\frac{1}{2}$ " to a giant 52 inches long — there are 29 patterns, 542 sizes with openings from $\frac{3}{16}$ " to $7\frac{7}{8}$ ". Correctly designed, they are made from selected carbon steel drop-forged and heat-treated for extra strength. Finish is black enamel.

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407 VULCAN STREET
BUFFALO 7, NEW YORK

New Annealing System Is Faster, Cuts Costs

A new system of annealing opened cold-rolled coils in 12 hours in a rotary furnace was announced by Lee Wilson Engineering Co., Cleveland.

The company points out its method saves about \$2 per ton over the presently used stack furnaces, not to mention the time saving of from 10 days to 2 weeks.

How it Works—In the new system, the coils are loosened and fed into a 7-station, merry-go-round, recuperative-type furnace. Heating rate is increased up to 250 times because heat can penetrate between the sheets rather than work its way into a tightly wound coil.

Fuel consumption is also cut by about 40 pct by a recuperative system. In this, heat from coils cooling off in the last two stations is forced

into the first two stations where coils are being pre-heated.

Savings — Other major savings are realized through capital investment in only 18 coils rather than 240 being in process at once, and lighter and smaller buildings and equipment. The furnace itself costs about \$900,000 to \$1.07 million for a 4-stack type. Production rate is about 20 tons, or a coil, per hour.

Ford Realignment

Ford Motor Co. has realigned manufacturing activities, including changes in executives responsibilities, and the election of a new vice president.

Ford's manufacturing plants have been rearranged into six divisions, components of two new groups—the Power Train Group and the Body Group. Henry Ford II said the move arranges plants so they are more closely related in respect

to processing techniques, engineering requirements and products manufactured.

New Vice President—C. H. Patterson, the new vice president, heads the Power Train Group. This includes Engine and Foundries Div., and Transmission and Chassis Div.

Irving A. Duffy, a vice president, directs the Body group. It is composed of Metal Stamping Div., Hardware and Accessories Div., Steel Div., and Glass Div. In addition, the Tractor and Implement Div. will continue to report to Mr. Duffy.

A new manufacturing research office has been established. It has responsibility for advanced production engineering projects, manufacturing research and development of manufacturing processes. D. J. Davis, vice president, will be its head.

H-Iron Plant

Speedy engineering work has caused Alan Wood Steel Co., Conshohocken, Pa., to move up the target date for completion of its new iron powder plant.

It is now estimated that production will start in the 50-ton-per-day installation early 1959.

The new plant will use the H-Iron Process to produce high purity iron in powder and briquet form. It will burn coke oven gas, and use iron ore concentrates from Alan Wood's own mines or mill scale from its hot-rolled steel operations.

Return to Earth

R. G. LeTourneau, Inc., will re-enter the earthmoving equipment industry after an absence of five years. The target date is May 1.

The re-entry will be gradual, says company president, R. G. LeTourneau. It will be a couple of months before design of the machines will be set.

The company sold its earthmoving business to Westinghouse Air Brake Co. in 1953 for \$31 million. A provision of the contract was that LeTourneau remain out of the earthmoving field for five years.

New Refractories Plant in the Midwest



BRICKS: Harbison-Walker Refractories Co. employee works on Metalkase brick at the company's newest basic refractories plant, at Hammond, Ind. This particular site was selected for its proximity to raw materials, and the expanding markets in and around Chicago.



SOME TRADEMARKS NEVER DIE . . .

they just change a little along the way. Their great strength is in the message they hold.

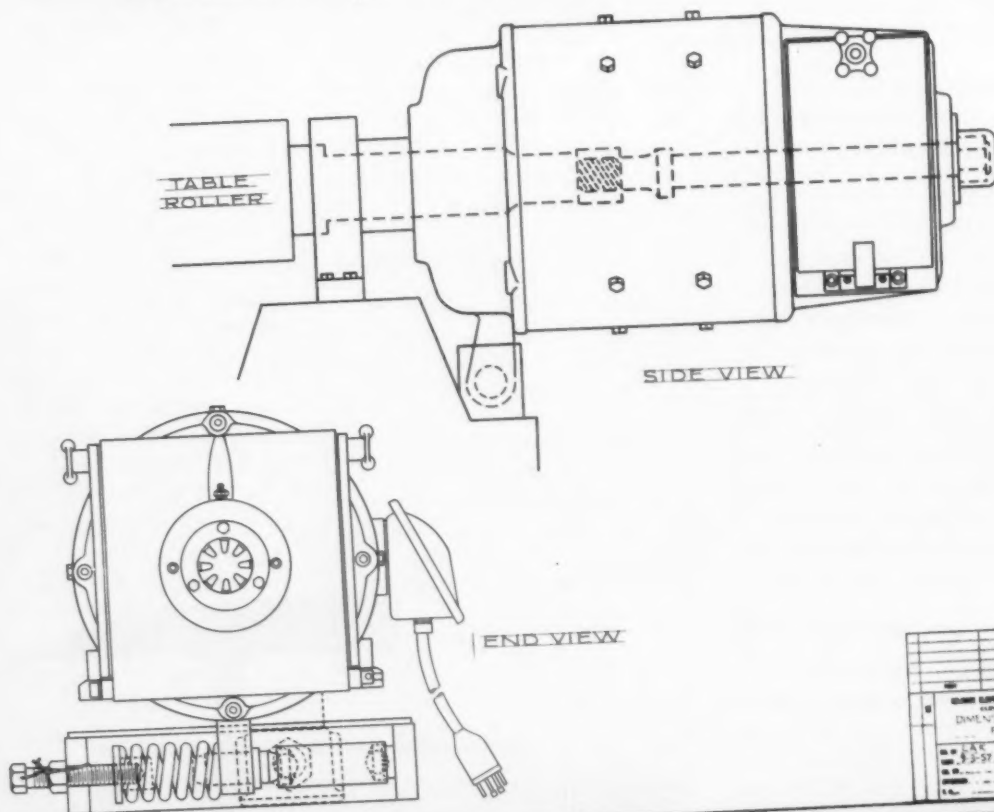
The symbolism inherent in the hammer and retort of our old trademark hasn't changed: the hammer signifies the mineral wealth locked in the earth's crust . . . the retort signifies the power to transform these riches into useful products. Together, in both the old trademark and the new one shown below, they symbolize the fruitful marriage of the earth sciences and chemistry that is the tradition and the future of the . . .

FOOTE
MINERAL COMPANY

Eighteen W. Chelton Bldg., Philadelphia 44, Penna.



RELIANCE FLOATING D.C. RUNOUT TABLE MOTORS



Reliance runout table motors cut installation and maintenance costs

Reliance Hollow Shaft, floating motors are easy to install. They require no special pedestals or flexible couplings.

The hollow shaft motors fit right over the table-roller shaft. No special alignment is required. Warpage and backlash compensation are handled by the heavy tie-down spring. Not only are coupling maintenance and lubrication eliminated,

but a much greater degree of roller misalignment can be tolerated.

Reliance Floating motors are designed and built specifically for runout table service. They are available with a wide range of speeds and out-put torques. For complete information contact your local Reliance Representative, or write for Bulletin No. F-2051.

C-1887



RELIANCE ELECTRIC AND ENGINEERING CO.

DEPT. 24A CLEVELAND 17, OHIO
CANADIAN DIVISION: TORONTO, ONTARIO
Sales Offices and Distributors in principal cities

A. Watson Armour, III

Man With a Tested Growth Plan

Having bridged the gap from meat packing to metalworking, Mr. Armour has become a leader in the fastener industry.

His emphasis on research is giving the familiar blind fastener a new look.

■ How can a small company grow in a field as competitive and uncertain as aircraft parts supply? Ask A. Watson Armour, III, president of Huck Manufacturing Company, and he'll say, "Don't compromise quality, stay ahead technologically, and build a diversified market."

These concepts have been parlayed into a fabulous success story that spans 12 years, beginning when Mr. Armour bought controlling interest in Huck in 1946. Under his guidance, yearly sales have jumped from the 1946 figure of about \$350,000 to more than \$10 million last year. Huck today is one of the largest manufacturers of blind rivets in the world.

Wanted Challenge—Mr. Armour, a great grand nephew of the founder of Armour & Co., joined the Chicago meat-packing firm following studies at Princeton. After 10 years as a sales executive there, he left to begin his association with Huck. "I wanted a challenge—a chance to show what I could do on my own," Mr. Armour points out. "Huck Manufacturing Co. provided that challenge."

He became president in 1952 after having set into motion a program of market diversification that has had phenomenal results. Right up until the end of the Korean military action, Huck produced fasten-



A. WATSON ARMOUR, III: Diversification begins with research.

ers for just one industry—aircraft. Production was frozen in this market by the government.

Research Booster — When the military lid was removed, Mr. Armour swung into action. In a few years, Huck's markets have been broadened to include railroad, marine, bus, trailer, and construction industries. Today, only 50 pct of dollar volume lies with aircraft and the military. During this period, gross sales showed a startling twelve-fold increase.

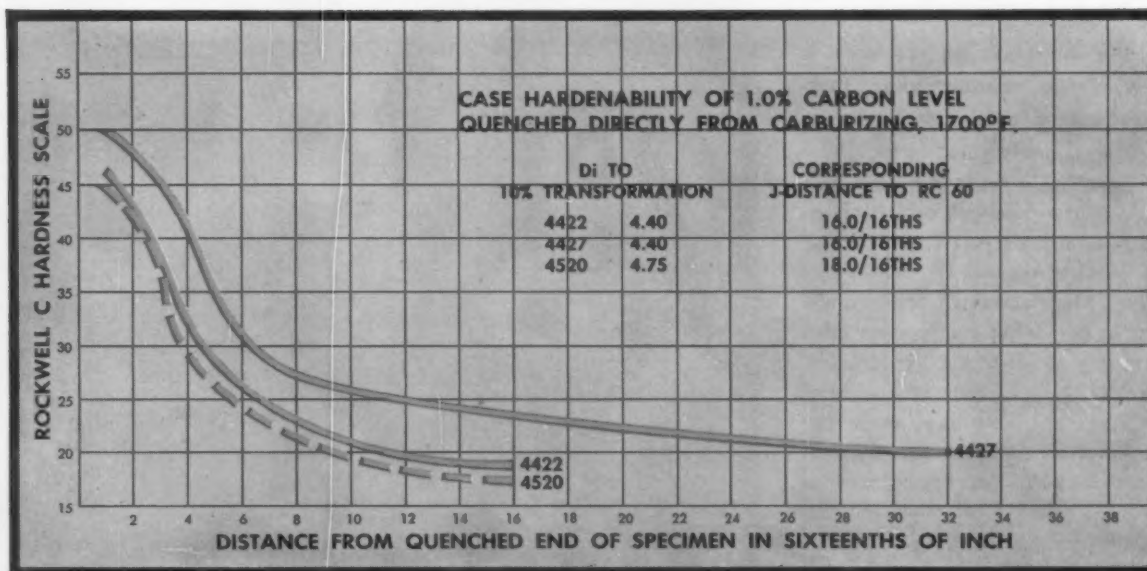
Providing new products to keep pace with broadened markets has been a key factor in the Huck suc-

cess story. With a firm belief that research is the life-blood of a manufacturer of quality fasteners, Mr. Armour has seen to it that Huck's research department has the best of equipment and a free hand.

Civic Leader—Like so many leaders of industry, 49-year-old Mr. Armour somehow finds time to devote to civic work. He is active as a trustee and committee chairman of Presbyterian-St. Luke's Hospital in Chicago; as a director and committee chairman for the Salvation Army; and as a director of the Shedd Aquarium and of the Tuberculosis Institute.

NOW! 3 new moly carburizing steels

4422, 4427 and 4520



The Timken Company is now producing in quantity three new molybdenum carburizing steels—4422, 4427 and 4520. These new steels are already providing important economies for manufacturers of ring gears, pinions, transmission and differential gears.

These fine grained direct quenching steels offer the following advantages:

1. **ECONOMY**—They offer you overall economies in every step of your production process.
2. **EASILY ANNEALED**—These steels respond to simple annealing treatments including direct air cooling.
3. **MACHINABILITY**—Users of these steels report good machinability.

4. **HIGH CASE HARDENABILITY**—See chart.

5. **HIGH CASE HARDNESS**—Direct quenching from 1700°F produces high case hardness.

6. **A DESIRABLE RANGE OF CORE HARDENABILITY**—See chart.

These new moly carburizing steels are available in bars, forging billets and tubes. Our metallurgists have been working with these new steels for more than two years. They will be glad to discuss them with you. Write or phone: The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

TIMKEN *Fine Alloy* STEEL

TRADE-MARK REG. U. S. PAT. OFF.

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS STEEL TUBING

Question Mark in Capital Goods

It's doubtful if a full recovery can develop without major capital goods outlays.

The doubtful outlook for new plant and equipment spending is the big question mark in the long-term business picture.

■ Business forecasters are generally agreed there will be a gradual business upturn later this year and into 1959. After that, the hedging starts.

Reason for this vagueness is the questionable outlook for capital goods. Improvement this year is expected from an upturn in consumer goods and a flurry of inventory replenishing.

Needs More Momentum — But it's doubtful how far this upturn can continue from its own momentum. If a moderate business improvement is to develop into a reasonable facsimile of the recent boom years, it will have to be backed up by a renewal of capital goods spending.

There is no indication of another capital goods boom for some time. Latest survey by the Dept. of Commerce and Securities and Exchange Commission indicates that capital expenditures will decline 13 pct in 1958 from last year.

Looks Bad to Many—It further indicates the decline will continue through the second half of 1958. Many businessmen, eying their poor order books and idle plant capacity, can visualize the decline continuing further.

It's significant that the two principal factors in the 1949 and 1954 recessions were declines in capital spending and inventory cutbacks. The situations then were similar to now, but the demand for new plants

and equipment is not clear on the business horizon.

Growth Factors — Remember, after 1954, the boom in capital spending resulted in a rise of about 40 pct in expenditures for new plants and equipment. Some economists and businessmen now fear that much of industry is over-expanded and a capital goods holiday may be in the making.

But all growth studies indicate

that, in spite of many business fears, another round of capital spending will be dictated by population factors in the early '60s.

Meanwhile, you can expect revived defense spending and government programs for highways to throw an extra stimulus into the economy late this year and early next year. This should take up some of the capital goods lag and keep up the momentum.

Good Engineers Still Needed

Something to note in regard to personnel is that the demand for engineers is edging up slightly again.

As you know, in the space of a year the situation changed from one of critical shortage to one of virtual surplus. Severe aircraft cutbacks and subsequent business setbacks elsewhere resulted in a lot of engineers receiving their layoff notices.

Missiles Need Men—The increase in engineering and professional openings can be traced in large part to the missile program, which is finally making itself felt in the overall business picture after months of false starts.

Increases in openings are observed for chemical, electrical, industrial, mechanical and aeronautical engineers. Strangely enough, the demand for metallurgical engineers is still on the downside.

Skilled Labor Down—Openings are still only about one third of what they were a year ago. But it does indicate a possible trend. Most engineering cutbacks involved getting rid of the dead wood, and the search for good men is apparently reviving to some extent.

Skilled labor is still not showing any change in the trend to fewer openings. In fact, skilled classifications had the greatest decline.

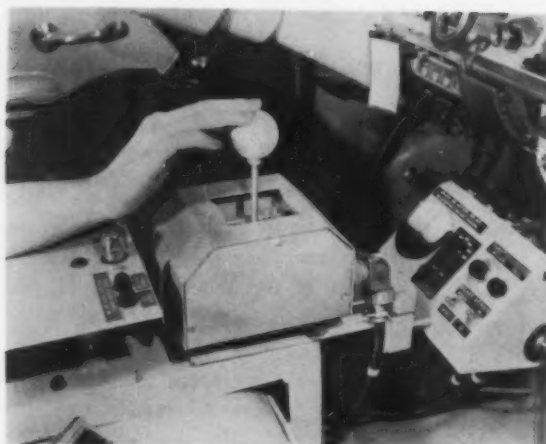
Keep Up Your R and D Programs

A cutback in your research and development budget now might be a very serious mistake. Probably your competition is going ahead full scale with his.

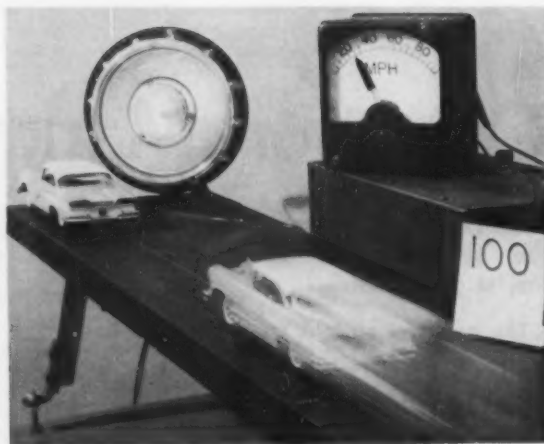
Apparently there is little tendency on the part of business to sacrifice its programs of developing new processes and products. If anything, current competitive markets have intensified them.

Armour Research Foundation of Illinois Institute of Technology actually reports a record volume of research and development contracts for the first half of the year. This is reflected in both industrial and government contracts.

In fact, new industrial research programs are 14 pct over the first half of last year, indicating many businesses hope new developments will help solve some of their business problems.



BIG STICK: General Motors' Unicontrol system uses a 4-in. stick to turn, brake and accelerate.



WARNING: A Ford device warns the driver when the speed of an overtaking car may cause a collision.

Why Safety Is a Delicate Subject

High cost of safety makes it a touchy topic in Detroit.

But legislative interest prompted automakers to show off their projects to a special committee of governors.

Don't expect radical changes soon.—By H. R. Neal.

■ Safety is a touchy subject with auto people. The price is high, and the topic is unpopular. But the unpopular topic is the popular theme of much legislative talk at Federal and state levels.

To head them off at the overpass, Detroit's automakers guided visiting members of the Governors' Conference Special Committee on Highway Safety through a 2½-day tour of the industry's safety research activities.

Probe Industry Programs—Lead by Gov. Abraham A. Ribicoff, of Connecticut, the safety committee focused on what the auto industry is doing to make its products safer. Gov. Ribicoff also doggedly dug for reasons automakers don't make

existing safety equipment, specifically seat belts, standard equipment. It proved to be still a tender spot with the automakers.

J. O. Wright, vice president and general manager, Ford Div., told the governors it is a matter of consumer acceptability. He said his firm installed seat belts in about 115,000 cars in 1956 at an \$800,000 loss. Last year, only 50,000 Ford products were so equipped. And this year only 2 pct have seat belts specified as equipment.

Cost of Safety—Paul C. Ackerman, vice president and director of engineering for Chrysler Corp., said it would cost the customer about \$550 more to purchase today's low-price cars if all available safety features, now optional, were made standard. This would include seat belts, foam padding, rear window defroster, automatic transmission, power brakes.

He added somewhat lower prices would be achieved through volume installations, but the added cost would still be several hundred dollars.

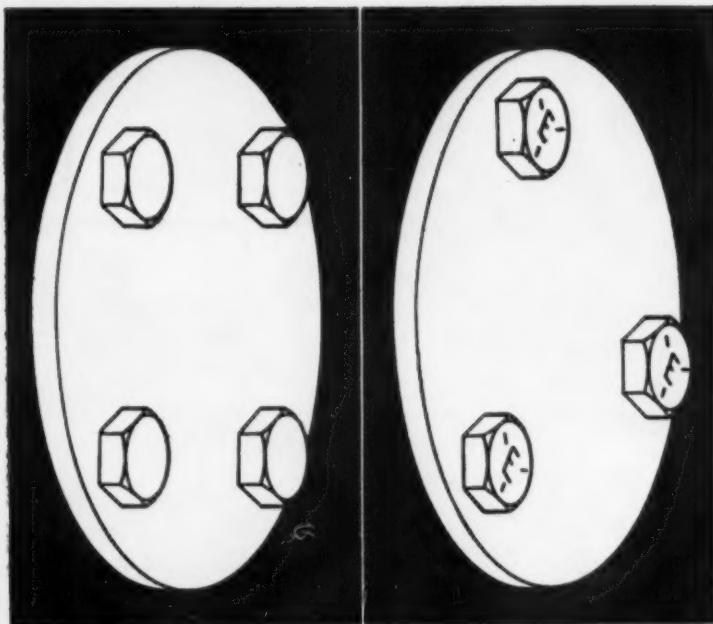
Harlow H. Curtice, GM president, said the auto industry hasn't learned how to make a car "driver-proof." "The biggest single need today is for increased recognition of human behavior as a safety problem."

Favorable Comment—The automen drew unexpected help from within the committee. Gov. Robert B. Meyner, New Jersey, said if legislation is enacted to make safety belts compulsory, "probably 90 pct of the car riders would not use them."

Wyoming's Gov. Millard L. Simpson also took a dissenting viewpoint. He believes the 48 states are far behind the auto industry in cooperative safety programs. "I am deeply concerned on how we can catch up with the auto industry on highway safety," he said.

Michigan's Gov. G. Mennen Williams urged the industry to design its products to make repairs less costly. High repair costs, he said, have pushed insurance costs up. "In order to pay insurance premiums, a motorist may put off re-

ECONOMIC FACTS ON FASTENERS



SIMPLE CHANGE SAVES UP TO 40% ON FASTENER COSTS

● High strength bolts deliver more "holding power" per dollar

● Savings in production can also be realized

Figure the cost of fasteners as if you're buying *clamping force* to hold together an assembly. This way, \$1.65 worth of "holding power" in machine bolts costs you only \$1.50 if bright cap screws are used . . . but only \$1.00 in high carbon bolts.

Viewed another way, it means that the stronger fastener can be smaller for a given application, and so costs less. Or it can mean using fewer fasteners.

Either way, you save. On direct fastener costs; on manufacturing. With *smaller* fasteners, there are smaller holes to drill (or maybe you can even go to punching). With *fewer* fasteners, there are fewer holes to fill. (In the sketch above, fastener assembly time would be cut one-fourth.)

• **Case History:** Where an application is suited to high strength bolts the savings can be substantial. One Midwest farm equipment plant that standardized on them saved \$12,000 the first year, \$28,000 the second.

Manufacturers willing to review their requirements with an RB&W Fastener Man may find it rewarding. He's a technical specialist who can help you save money in assembling your products with standard fasteners. Russell, Burdall & Ward Bolt and Nut Company, Port Chester, N. Y.



Plants at: Port Chester, N. Y.; Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. **Additional sales offices at:** Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas; San Francisco. **Sales agents at:** Milwaukee; New Orleans; Denver; Fargo. **Distributors from coast to coast.**



Spin-Lock "tooth" about to bite in. Head meets seat when fully tightened.

Spin-Lock Screws solve assembly problem

The designer specified countersunk-head screws to be used in a particular casting. The production man had to stake these in to anchor them. But this meant extra operation, made screw removal damaging and difficult.

The answer was found in Spin-Lock screws. These have hardened "ratchet-action" teeth that bite in when tightened, take 20% more torque to loosen than to tighten, can be reused. Send for Bulletin.

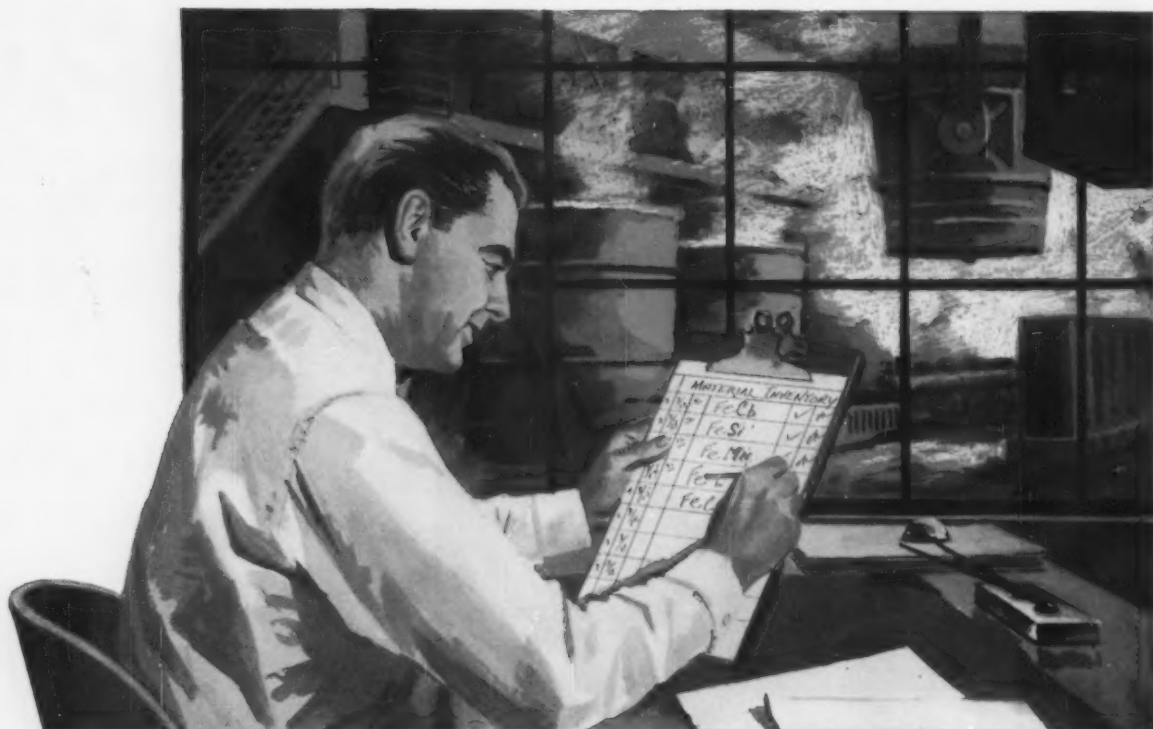


Silicon bronze fasteners combine desirable features

Silicon bronze offers the highest conductivity in fasteners able to withstand high stresses. It resists corrosion, stays free from season cracking, too. It makes ideal fasteners for electrical use where tensile strength is important; or for corrosive environments.

One of the first to develop such fasteners, RB&W cold works them for tensile strength and for clean, well formed threads that don't seize. Oval bolts, hex bolts and nuts, and U bolts available. Specials can be developed.

RB&W FASTENERS—STRONG POINT OF ANY ASSEMBLY



✓ **Unlimited**

Columbium for industry

With the world's largest raw material reserve of columbium, MCA can now assure steelmakers that columbium is readily available in quantity and will continue to be in plentiful supply for future needs.

In Type 347 stainless for example, long recognized for reliability in corrosion resistance, manufacturers no longer are faced with imposed restrictions requiring the use of substitute materials. Welding rods destined for severe service offer another advantageous use for columbium. Our continuing research and experience indicates that wherever design demands a material that will meet rigorous requirements—especially in heat and corrosion resistance—columbium's properties are being found most rewarding.

MCA experience in columbium steels is very broad, including many new uses. Steelmakers, engineers and metallurgists are invited to write, stating their particular interests, for a prompt and confidential response.

MOLYBDENUM

Grant Building

CORPORATION OF AMERICA

Pittsburgh 19, Pa.

Offices: Pittsburgh, Chicago, Los Angeles, New York, San Francisco
Sales Representatives: Brumley-Donaldson Co., Los Angeles, San Francisco
Subsidiary: Cleveland-Tungsten, Inc., Cleveland
Plants: Washington, Pa., York, Pa.



Automotive Production

| WEEK ENDING | CARS | TRUCKS |
|----------------|-----------|---------|
| April 19, 1958 | 74,648 | 16,764 |
| April 12, 1958 | 84,896 | 16,863 |
| April 20, 1957 | 118,327 | 23,366 |
| April 13, 1957 | 126,194 | 22,761 |
| TO DATE 1958 | 1,451,100 | 275,400 |
| TO DATE 1957 | 2,166,600 | 349,200 |

*Preliminary

Source: Ward's Reports

placing worn tires or having repair work done."

Ford Projects—During the committee's stay, Ford Motor Co. revealed several projects being evaluated at its Dearborn, Mich., Research and Engineering Center.

One is a "joy-stick" steering system incorporated in a 1957 Ford. Instead of a steering wheel, the car is guided by a vertical "stick" mounted in the center of the instrument panel.

Another is a warning light system mounted in two miniature cars. It incorporates a photo-electric cell principle and a computer. The device flashes the brake lights of one car automatically if a vehicle is approaching from the rear at a speed that might cause a collision. At present, it can only be used at night.

Foam Protection—Ford also exhibited a prototype "safety" car incorporating many of the features recommended by the Cornell Aeronautical Laboratories. Among the features are a front bumper backed by a plastic foam for energy absorption, and an 11 in. diam steering column hub also plastic foam.

In fact, the interior of the car is covered with energy absorbing foam wherever practical; door pillars, roof, instrument panel.

Seats, both front and rear, are designed to support the passengers' heads against whiplash during a severe rear-end collision. Foam cushion padding along the top and back of the front seats affords protection to rear seat passengers. Floor anchored seat belts, on retractable reels, are equipped with automatic inertia-locking devices activated by sudden thrust.

General Motors' Ideas—General

Motors presented two ideas for improving safe highway travel—an experimental automotive control system, and a road design plan.

GM's steering system is even more highly refined than the Ford "joy-stick." Dubbed "Unicontrol," it is a combined hand-operated electro-hydraulic steering, braking and throttle system. The driver's control unit is a single, 4-in. stick located to his right.

Move the control to the right or left; the car moves right or left. Move it forward; car speed increases. Pull it back, and it brakes. The "stick" moves only 2-in. from center in any direction. An electronic computer and hydraulic power supply work in conjunction with the stick. The steering ratio will vary with car speed.

Not Yet—While the governors saw the various devices in action, they were cautioned not to expect them on passenger cars next year. The automakers pointed out the safety merits of these devices have yet to be proven. And it will have to be determined how practical they are to manufacture.

The road-design plan is aimed at preventing or lessening severity of off-the-road accidents. It calls for removal of roadside trees and other obstacles within 50-ft of the road, flattening road shoulders and grading parallel drainage ditches and ravines.

Now automakers, after their elaborate presentation, must wait. The safety committee won't make known its opinions and recommendations until the next full meeting of the Governors' Conference in May.

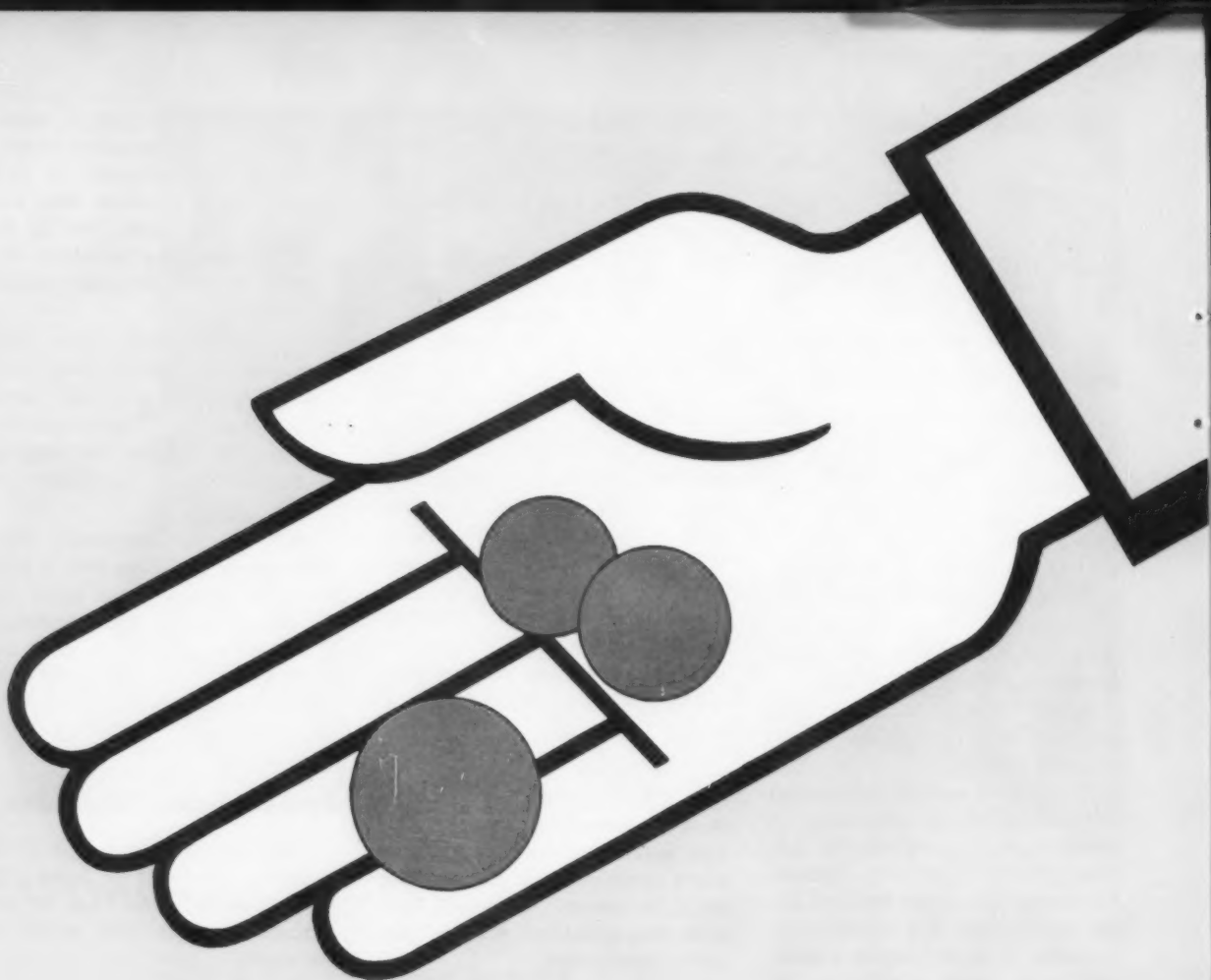
However, the automakers have been assured they have little to fear. "We can definitely cut down the number of deaths on the highways of this country. But we don't intend . . . to make your industry the scapegoat," Gov. Ribicoff told auto executives.

Power Steering Gains

Dodge reports 70 pct of its 1958 model cars are being produced with power steering. This is a 59 pct increase over the same period of last year.

THE BULL OF THE WOODS





*Still handing out pensions
to obsolete machines?*

Talk to

Snyder

TOOL AND ENGINEERING COMPANY

3400 E. Lafayette, Detroit 7, Michigan

Special Machine Tools with Automation for More Than 30 Years

Recession Abets Welfare State

Congress Yields to Demand for U. S. Action

Congress has learned that the public demands and expects the government to step in when the economy gets out of line.

Some lawmakers are discouraged over public reliance on big government to solve all ills.—
By G. H. Baker.

■ Washington has learned a lot from the current business recession. The set-back has taught politicians at least one thing: People are no longer willing to tolerate even a mild recession.

The day is evidently long past when we'll see the normal operations of free markets and free prices relied on to bring about a leveling-off of all business activity.

Food for Thought — Actually, the trend toward government action to nullify business recessions has been under way for the past 30 years. But the present sag in business has brought into sharp focus the fact that today almost no one is willing to wait for natural economic forces to correct the ups and downs of the economy.

In the cloakrooms of the Senate and the House and in the offices of White House advisors, thoughtful and perceptive politicians are soberly weighing this new fact of political life. The best political barometers — congressional elections, congressional mail—indicate clearly that people are no longer willing to cope with the vagaries and caprices of free markets and free prices. Right or wrong, this is the way the voters are thinking these days.

Welfare State Drift — Many

sober-minded members of Congress who try conscientiously both to serve their states and their districts and also to espouse the free enterprise system are privately discouraged these days by the continuing drift toward a controlled economy.

Whether we approve of it or not, it's apparent that we're living in what amounts to a Federal welfare state. Both political parties are committed to courses of action calculated to prevent inflation, deflation, recessions, unemployment, overproduction, and under-consumption. And both the Congress and the executive branch of govern-

ment are making it clear that Washington will move in a massive way to prevent any of these conditions from coming about.

Don't Want Deflation—It's now evident that a majority of the voters is unwilling to let the natural laws supply and demand operate to equalize business fluctuations. Clamor for government action now arises almost at the first sign of a sharp upturn or downturn in economic activity.

Clearly, most people don't want deflation, although they may talk loosely about the "need" for it. They actually prefer mild inflation.

Congress: It's Time to Be Counted

■ The current session of the Congress soon will be in the final inning. About two-thirds of this year's session is now history. Here, at a glance, is what we can expect in the remaining weeks:

Taxes—Some cuts are still likely, despite frowns from the White House. Best bets: Reduction (but not cancellation) of the 10 pct Federal excise on new automobiles, lowering by 2 or 3 percentage points of the existing 52 pct tax on incorporated income, possible cancellation of 3 pct tax on freight shipments, possible across-the-board cut in individual income tax by increasing exemptions from \$600 to \$700.

Labor — Federal registration of pension and welfare plans probably will be required. And that's about

as far as the Congress is willing to go in an election year.

Defense—Biggest peacetime defense budget—around \$42 billion—will be voted. More emphasis on missiles.

Foreign Aid—Substantial cuts in the making here. It's hard for politicians to explain how foreigners can collect U. S. "friendship" gifts, while U. S. unemployed worry over bills.

Unemployment Pay—Some kind of new law will emerge to provide extra jobless benefits to those who have exhausted their payments. But the size and details of the program are still a matter of hot debate.

Reciprocal Trade—Extension of the low-tariff program for one year looks likely. Ike's plea for five-year extension, plus further tariff cuts, gets a cold shoulder.

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5 YEAR
USER

**"Definitely the key machine
in clean-up operations"**

Dewey Bros., Inc. at Goldsboro has been in business for 73 years and is the second largest foundry in North Carolina. It now uses two model HA "PAYLOADER" tractor-shovels and a larger model HAH to handle about 275 Tons of sand three times daily.

John H. Daniels, Dewey Bros.' equipment superintendent, referring to this model HAH "PAYLOADER" says, "it has been the most trouble-free machine ever used on the job . . . has had less than 35 hours lost time in nearly 3 years of continuous service. I want to say also that the "PAYLOADER" Distributor offers the best service of any of our suppliers."

Edgar Knowles, asst. night foreman, also adds, "Our HAH is definitely the key machine in the clean-up operation. It is fast, maneuverable and dependable. The roll-back bucket carries a heaped load without spillage."

Whatever size or sizes of tractor-shovels you need in your operations, you can be sure, like Dewey Bros., Inc. of getting top production and dependable performance if you choose a proven "PAYLOADER", plus unmatched service from the Hough Distributor that sells them. It will pay to have him show you what a "PAYLOADER" can do. Ask him about Hough Purchase and Lease Plans too.

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SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY



Salesman's Roadmap for Farwest

New Prospects Well Worth a Sales Call

Expansion isn't marking time on the West Coast. New firms are setting up shop, existing ones are enlarging.

Here's a rundown on those in southern and northern California.—By R. R. Kay.

■ Despite the recession, the march of people and plants to the Farwest continues. And they create a demand for an ever-widening range of products and services.

Here's an up-to-date list of Southern California's new and expanding metalworking plants:

Ball Bearings and Castings—Federal-Mogul-Bower Bearing, Inc., El Monte—miniature ball bearings; Adams-Campbell Co., Ltd., Los Angeles—tools, dies, and screw machine products; Lestro Div. of LS Engineering Co., Van Nuys—electric staplers and footstitchers.

Kay-Brunner Steel Products, Inc., Alhambra—steel castings, heavy duty truck-trailer axles; Everest & Jennings, Los Angeles—wheel chairs; Capitol Metals Co., Inc., Vernon—flat rolled products.

From Roof to Kitchen—Romla Co., Los Angeles—roof ventilators; A & T Machine Co., Gardena—aircraft parts; Zero Manufacturing Co., Burbank—metal instrument cases; Hufford Corp. Div. of The Siegler Corp., El Segundo—stretch-forming presses; Starlite Mfg. Co., Inc., Gardena—sheet metal shop.

Waste King Corp., Van Nuys—incinerators, garbage disposers, dishwashers, ranges; Lynch-Jamentz Co., Los Angeles—kitchen tools and cooking racks; Rytron Co., Inc., North Hollywood—electronic equipment.

Thomsen Supply Co., Los Angeles—plastering machinery; Ryan Aeronautical Co., Inglewood—aircraft and missile parts; Thayer Grinding Co., Long Beach—precision grinding.

From Sky to Mine—DeTemple Helicopters, Inc., Los Angeles—commercial helicopters; Deutsch Co., Inc., Gardena—fasteners, aircraft fittings; Clinton Machine Shop, Los Angeles—bakery machinery; Edwards Tool and Die Making,

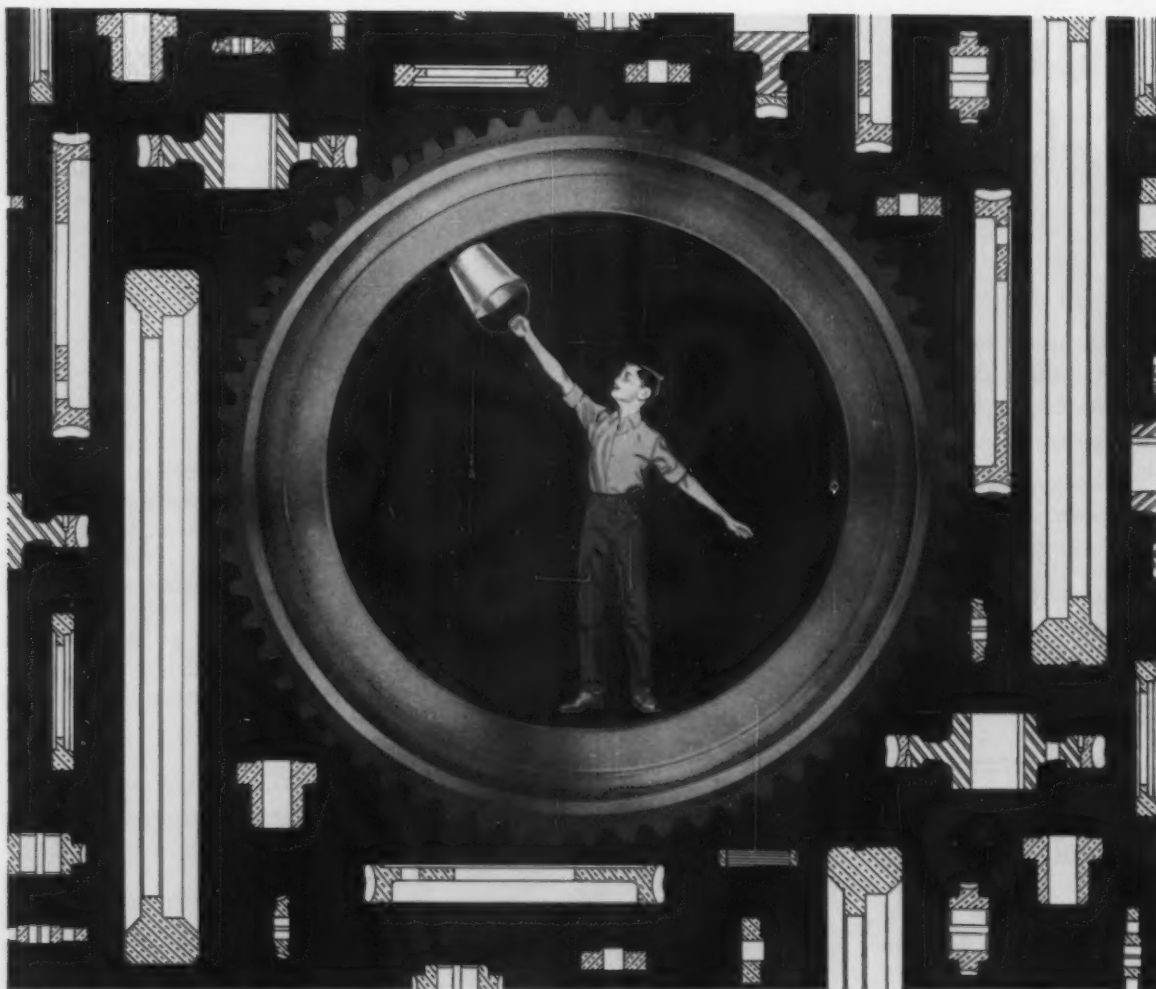
North Hollywood; Keystone Engineering Co., Los Angeles—mining machinery gears, aircraft parts.

Busy in the North—Metalworking plants also continue to expand on the Oakland-San Leandro side of San Francisco Bay. Here are some of the growing firms: Precision Founders, Inc.—makers of tool and die equipment; Hydra-Shear, Inc., and Oakland Iron Works—steel fabricators; C. E. Toland & Son—iron and steel fixtures.

Man-Made Men Serve Aircraft Science



INTRODUCING ANTHROPOMORPHS: Engineers at North American Aviation use these rubber-skinned dummies to perfect systems for getting human pilots safely back to earth in case of aircraft failure. Electronic equipment in chest and stomach cavity records wide variety of data.



Centrifugally cast gear blanks...in BRONZE ...are stronger, last longer!

Big gears and intricate shapes — our specialty!

We cast many blanks centrifugally . . . in sizes up to and even beyond 72" in diameter. Because centrifugally cast gears have proved their added strength, toughness and long-wearing characteristics for many problem applications.

Laboratory testing and field experience show that physical and mechanical properties of centrifugal castings are as much as 10-15% better than those of most static castings.

But whatever the shape or size of the gear blank

NBD can cast it for you (centrifugally or statically) in gear bronze, aluminum bronze, manganese bronze —to your specifications. Want iron or steel hubs cast in? We can do it. Want castings furnished rough, rough machined, or finished machined? Want sand castings, shell moldings, chilled rim or chilled three sides? You name it.

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NATIONAL BEARING DIVISION

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PLANTS IN: CHICAGO, ST. LOUIS, MEADVILLE, PA.

New Records for Ceramic Tools

Tests Indicate Higher Production, Lower Costs

GE's Metallurgical Products Dept. machines 1045 steel at fabulous rates with ceramic tools.

Results are so successful that tougher machines may be needed.—By E. J. Egan, Jr.

■ You're probably not quite ready to do the same thing in your own machine shop but it is possible to machine 1045 steel at rates up to 18,000 fpm. This is just one of the things that engineers of General Electric's Metallurgical Products Dept. are doing with cemented oxide (ceramic) tools in their machinability lab in Detroit.

For this special demonstration, they chose a 13-in. diam, 48-in. long billet of 1045 steel with a hardness of 170-173 Brinell. They set it up on a specially designed, 185-hp, 20-in. LeBlond lathe and revved the machine up to the 18,000-fpm rate.

Less Than a Minute—With the grade 0-30 cemented oxide tool feeding at 0.010 ipr, and taking a 0.10 in. depth of cut, it took less than a minute for a pass across the whole billet.

H. J. Siekmann, manager of applied mechanics engineering for the Metallurgical Products Dept., says that, by comparison, the standard type of carbide machining on this billet would be done at about 950 fpm.

Sensational Results—From 950 to 18,000 fpm is quite a jump. Is it really significant, or just spectacular? Siekmann explains its significance with these figures: "Production machining cost per piece is

halved. Production increases by 145 pct . . . even with the high non-productive time of six times the cutting time. With automatic loading to cut the non-productive time in half, costs would be reduced almost a quarter and production would jump another 68 pct."

There's no telling what the production gains and cost savings would be at higher rates of speed.

Tougher Machines Needed — So chalk up ultra high-speed machining as one area the ceramic tool boys are staking out. The next step is up to the machine tool builders, they say. The need is for still more rugged and rigid machines, "capable of using much greater horsepower."

But if the ceramic tool makers have one eye on the sky, they have the other focused on two more conventional metal cutting areas where they're gaining ground steadily.

Other Developments — One involves a number of turning operations where high speed steel and carbide tools have long held sway. Ceramics don't promise to take over in every case, but enough switching has already been done to point out the trend.

The second area involves the use of ceramic lathe tools to do more and more of the work now done by rough or semi-finish grinding. General Electric sees a big future here.

Fastest Turning Ever Done?



AT 18,000 FPM: This LeBlond lathe in GE's machinability lab tests cemented oxide tools for a new era of ultra high speed metal cutting.

INDUSTRIAL BRIEFS

Very Top Level—A special Economic Mobilization Conference of the American Management Assn. will be held at the Hotel Astor, New York on May 19-20. President Eisenhower, Vice President R. M. Nixon, Secretary of Commerce Sinclair Weeks, and sixteen presidents and board chairmen of leading American corporations will be on the program.

Airborne—Col. W. F. Rockwell, board chairman of Rockwell Spring & Axle Co., has signed an agreement with G. T. Pew to acquire, through an exchange of stock, not less than 82 pct of the stock of Aero Design & Engr. Co. Latest diversification move aims to put Rockwell Spring & Axle Co. in the aircraft business. Aero Design & Engr. Co. will operate as a subsidiary.

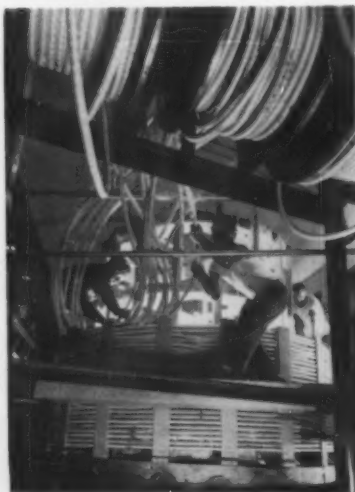
Nuclear Possibility — The SS American Explorer has been launched at the Pascagoula, Miss., shipyards of Ingalls Shipbuilding Corp. The ship is designed to be quickly adaptable for wartime use as a Navy oiler. Contracts have been signed for engineering studies on the feasibility of equipping the vessel with an advanced type of atom-fueled power plant.

New Hanger—Young Spring & Wire Corp., Detroit, has sold the manufacturing facilities of its Star Service Hanger Div. for \$125,000. The purchaser is M & B Metal Products Co. of Birmingham, Ala., a garment hanger manufacturer. Young manufactured the garment hangers at Leeds, Ala., and Chicago, Ill.

Under Control — A contract has been awarded by Swindell-Dressler Corp. of Pittsburgh to Leeds & Northrup Co., Philadelphia, for temperature control equipment related to a modernization program at U. S. Steel Corp.'s Duquesne Works. The Corporation is installing a battery of 28 soaking pit furnaces, and the controls will regulate heat temperatures of these furnaces.

Pure Plus — Super-high purity aluminum is being produced commercially by Reynolds Metals Co. The Listerhill, Ala. plant is making ingots of 99.99 pct purity. The aluminum is used in catalysts for high-octane petroleum refining and for jewelry and other wrought products requiring a special finish.

Coordination!—The Coordinated Products Div. of the K W Battery Co. has been created. This addition will serve the demand for allied products including battery chargers. The K W Sales and Service Organization will be expanded to provide nationwide coverage to all markets, including industrial, railroad and public utilities.



HOT SHOT: Westinghouse calls this the world's largest inductance coil. Its job: To store energy, then release it in form of blistering 32,-400 mph heat blast for aerodynamic and astronautic testing purposes. Finished assembly is operating in Gas Dynamics Facility, Arnold Engineering Development Center, Tullahoma, Tenn.

Reactor for Export — Clevite Corp. has received a contract for Sweden's Aktiebolaget Atomenergi R2 Materials Testing and Research Reactor. The company will produce materials test reactor-type fuel elements and control rod sections. The reactor has been designed and is being built by Nuclear Products-ERCO, Div. of ACF Industries, Inc.

Well Dressed—Silver clad stainless steel is the newest addition to the clad metals line of American Silver Co., Flushing, N. Y. It is finding wide use as an efficient, inexpensive, and durable electrical contact material. American Silver Co.'s silver clad stainless steel is made by metallurgically bonding a thin layer of silver to type 430 stainless steel.

Strength vs. Weight—The Parish Pressed Steel Div. of Dana Corp., Reading, Pa., and U. S. Steel Corp., have produced a new prefabricated truck body frame made of high-strength steels. The steel frames are stronger, and weigh slightly more than those of lighter material. They are more durable, and extra service life more than offsets a slight increase in weight.

Record for Canada—A record in the Canadian metals industry was established April 3rd by Canadian Steel Foundries (1956) Ltd. with the pouring of a 300,000 lb steel casting. The huge casting is the bottom platen for a 6,000-ton wheel forging press being constructed by Canadian Vickers Ltd. for Canadian Steel Wheel Ltd. The mold for the casting was a month in the making.

Double the Power—The Fluor Corp., Ltd., will design, engineer and construct an addition to the Cameo Steam-Electric Station near Grand Junction, Colo., for Public Service Co., Colo. The unit will add 44,000 kw to the existing 22,000 kw plant. Engineering work has started in Fluor's Los Angeles headquarters. Construction will begin in the spring of 1959, with completion set for April 1960.

Lighter and Brighter—Aluminum Co. of America is presenting a 16-mm, 20-minute film featuring street lighting advances achieved through the use of aluminum lighting standards. It highlights the value and effects of good lighting in achieving safety, crime prevention and beautification of cities. Production of lighting standards is pictured from the extrusion process to final tapering, wrapping and erection.

R. L. Brammer, elected president, Ackermann Mfg. Co., subsidiary of Wheeling Steel Corp.

T. D. Hyatt, elected treasurer, Walworth Co.

C. C. Gibson, O. E. Miles, Sam DuPree and **M. W. Laibe**, elected vice presidents, Goodyear Tire & Rubber Co., Akron, O.

J. L. Sullivan, appointed sales manager, Micromatic Hone Corp., Detroit.



E. G. Klein, elected president, Feller Engineering Co., Pittsburgh.

D. W. Sawyer, appointed asst. general sales manager, field operations, Tractor and Implement Div., Ford Motor Co.

H. W. Diefendorf, appointed superintendent, melting, Crucible Steel Co. of America's Sanderson-Halcomb Works, Syracuse, N. Y.



M. De Haas, appointed vice president, engineering, The Youngstown Foundry & Machine Co.



H. A. Beyer, Jr., named vice president, sales, and a director, De-Vlieg Machine Co.

R. V. Thomas, appointed director, international manufacturing and vice president, Goodyear International Corp.

J. E. Burrell, appointed general manager, operations, Columbia-Southern Chemical Corp.

J. W. Carlson, appointed superintendent, Blast Furnace Dept., Pueblo, Colo., plant, The Colorado Fuel & Iron Corp.

G. P. Kraft, named superintendent Stainless Steel Dept., Armco Steel Corp.'s Middletown, O., Works.



E. L. Bates, named president and general sales manager, Fostoria Pressed Steel Corp., Fostoria, O.

MEN IN METALWORKING

Following promotions are within Surface Combustion Corp., Toledo, O. **E. W. Weaver**, staff assistant to the vice president, engineering; **Don Beggs**, manager, engineering, Furnace Divisions; **O. E. Cullen**, manager, Research and Development Dept.; **J. Montagino**, chief engineer, Special Heat Treat Div.

R. W. Pierce, promoted to Boston district sales manager, Olin Aluminum Div., Olin Mathieson Chemical Corp.

D. W. Johnson, named manager, Reynolds Metals Co.'s aluminum reduction plant, Longview, Wash.

C. W. Murray, appointed manager, knife sales, Heppenstall Co., Pittsburgh.



Victor Holt, Jr., elected executive vice president, Goodyear Tire & Rubber Co., Akron, O.

C. R. Toolin, appointed district sales engineer, Cleveland-Pittsburgh area, The Fenn Mfg. Co., Newington, Conn.

R. F. Hurley, appointed technical sales representative, Metalworking Chemicals Div., The American Chemical Paint Co., Ambler, Pa.

Alexander Dreisin, named chief engineer, Allis-Chalmers Diesel Fuel Systems Dept., Allis-Chalmers Mfg. Co., Harvey Works, Harvey, Ill.



You may have met the man in the middle—

He is one of our C/R Sales Engineers. He, or one of his associates, may have been in your plant many times. Here, he's shown helping to check the installation of a C/R oil seal on a Detroit automotive assembly line—*after the seal design has been approved for production.* He wants to make absolutely certain this seal is installed correctly to assure maximum performance and service.

This personal supervision of skilled oil seal engineers and their careful attention to detail, typify every phase of research, design, production and testing of C/R Oil Seals. It accounts for the recognition C/R has earned in sealing applications. And it is a major reason why more automobiles, farm and industrial machines rely on C/R Oil Seals than on any similar sealing device.



If you have a sealing problem, critical or simple, bring it to Chicago Rawhide. C/R engineers will help you select the correct oil seal of existing types or will cooperate with you on a special design.

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OIL SEAL



DIVISION

CHICAGO RAWHIDE



How
To Get More
For Your
Metalworking
Dollar

MACHINING Nonferrous Metals

IN THIS FEATURE

With few exceptions, nonferrous metals are easy to machine. But even an easy job can be done in a right or wrong way. Machining nonferrous metals correctly means greater efficiency, a better product, increased profit.

That's why it pays to know more about the preferred methods for grinding, turning, drilling, milling, and other shop operations. Knowing more about the choice of tooling materials is equally important.

This feature covers machining practice

as it applies to four important groups of nonferrous metals: aluminum, magnesium, copper and copper-base alloys, and titanium. It provides detailed information on most of the machining operations you're likely to encounter.

In addition to hints on proper tooling, speeds and feeds, depth of cut, it also covers important pointers on lubricants and coolants. It's information that blends quality and engineering factors with the all-important matter of costs.

Aluminum Turns A Profit

Aluminum machines best at high speeds, moderate feeds and depths of cut.

Proper tool selection is important for efficient machining at lowest cost.

■ Aluminum is among the easier metals to machine, and it can be machined at high speeds. This is definitely one of its selling points. But because aluminum alloys differ in chemical, metallurgical, and physical properties, they do not all machine alike.

Most aluminum alloys can be machined on the standard machines found in most metalworking shops. Relatively few of them can be con-

sidered at all "critical" from the machining standpoint. In the interests of efficiency, however, it pays to familiarize yourself with some general rules that make the job of machining aluminum even easier. Once these are understood, it is a simple matter to master the principles that apply to the more specific machining operations.

More Machinable — Aluminum alloys are relatively soft. If you want to avoid damaging or distorting the material, care must be exercised in clamping or chucking. Unlike steel, aluminum alloys are not usually heat treated for the specific purpose of improving machinability. The cold work to which the material is subjected

during forming actually helps make it more machinable.

Based on tests at Alcoa, here are six general rules which should be followed in the machining of aluminum:

- Six Rules**—1. Grind more rake on the cutting tools than is common for machining steel.
2. Provide additional space for chips to form and be expelled from the tools.
3. Design tools so that chips and cuttings are directed away from the finished work.
4. Keep cutting edges sharp and free from burns or wire edges.
5. Maintain smooth, bright, tool face surfaces free from scratches.
6. Employ high machining

TABLE I | Speeds and Feeds For Turning Aluminum

| HIGH-SPEED STEEL | | |
|------------------|-------------|-------------|
| Cut, in. | Feed, in. | Speed, sfpm |
| 0.002-0.010 | 0.002-0.010 | 350-3500 |
| 0.005-0.015 | 0.002-0.005 | 300-2500 |
| 0.010-0.046 | 0.005-0.015 | 275-2000 |
| 0.046-0.094 | 0.005-0.015 | 250-1500 |
| 0.094-0.187 | 0.015-0.030 | 225-1200 |
| 0.125-0.234 | 0.015-0.046 | 200- 800 |
| 0.187-0.375 | 0.030-0.050 | 150- 300 |
| 0.375-0.750 | 0.030-0.050 | 100- 250 |
| CARBIDES | | |
| Cut | Feed | Speed |
| 0.005-0.015 | 0.002-0.008 | 450-7500 |
| 0.015-0.062 | 0.003-0.012 | 400-6500 |
| 0.078-0.156 | 0.010-0.030 | 350-8000 |
| 0.125-0.234 | 0.006-0.015 | 300-5500 |
| 0.187-0.312 | 0.015-0.025 | 200-4000 |
| 0.375-0.625 | 0.025-0.055 | 100-1500 |
| 0.687-1 | 0.020-0.050 | 75- 800 |

TABLE II | Drilling Speeds and Feeds

| Drill Diameter | Peripheral Speed, sfpm |
|-------------------|---------------------------|
| Less than 1" | 600 |
| 1" to 1½" | 550 |
| Over 1½" | 450 |

| Feed Per Revolution, in. | | | |
|--------------------------|-----------|---------|---------|
| Drill Diameter | Tolerance | 2011-T3 | 2017-T4 |
| 0.020 | 0.001 | 0.0015 | 0.0015 |
| 0.040 | 0.001 | 0.002 | 0.002 |
| 0.0625 | 0.0015 | 0.004 | 0.004 |
| 0.125 | 0.002 | 0.012 | 0.010 |
| 0.1875 | 0.002 | 0.0144 | 0.012 |
| 0.250 | 0.002 | 0.0168 | 0.014 |
| 0.375 | 0.0025 | 0.0204 | 0.017 |
| 0.500 | 0.0025 | 0.0204 | 0.017 |
| 0.750* | 0.003 | 0.0204 | 0.017 |

* Note: Feeds for larger drills usually depend on the power available in the machine.

speed, moderate feeds and depth of cut.

Best Tools — Economical machining usually starts with the selection of proper tools. Four types of tool materials can be used to machine aluminum. Plain-carbon tool steel is the least expensive. It is usually quite adequate for machining a limited number of parts. It will stand up best at slower machining speeds.

High-speed tool steel provides far better abrasion resistance and is generally tougher than an unalloyed steel. Cemented carbides are frequently preferred for large production runs. They combine extremely high hardness with excellent wear resistance.

About Diamonds — Along with special tool steels, diamond tips are sometimes recommended for light finishing cuts. These tips can produce a very high surface finish along with tight dimensional control. However, they are expensive and should be used only when justified.

Aluminum lends itself to any phase of turning. So long as tooling is correct and all components rigidly mounted and free from vibration, turning may be accomplished on a variety of standard machines including engine lathes, bench lathes, special duty lathes, horizontal and vertical turret lathes, and automatic screw machines. Choice of equipment will depend on both the nature of the machining operation and specific production requirements.

Turning Speeds — Practical speeds for turning aluminum vary from 75 to 7,500 sfpm; although even higher speeds have been achieved. Standard practice calls for feeds below 0.015 in. per revolution and depth of cut below 0.250 in. Depending upon manufacturing requirements, both of these figures can be exceeded.

Most shops find that feeds above the 0.020 in. range tend to reduce tool life appreciably. In roughing, normal speeds range from 800 to

TABLE III | Reaming Speeds and Feeds

| SPEEDS | | Hole Diameter | Depth of Cut | Feed per Revolution |
|---------------------|-----|----------------|-------------------------------|---------------------|
| Tool Diameter, sfpm | | | | |
| Less than 1" | 500 | Less than 1/8" | 0.003 to 0.004 | 0.007 to 0.010 |
| 1" to 1 1/2" | 450 | 1/8" and more | 0.004 to 0.008 | 0.010 to 0.020 |
| Over 1 1/2" | 300 | | Taper Reamers: 0.002 to 0.005 | |

1,500 sfpm. An increase in speed to 4,000 sfpm is frequently satisfactory for finishing cuts.

Less Wear—As is the case with other metals, many factors can effect both tool wear and machining quality. With aluminum, high surface speeds with moderate to light feeds usually produce the best results.

Tables compiled by Kaiser serve as a ready guide. Tool materials made of nonferrous alloys will permit the use of still higher speeds. Carbon steels will take speeds up to about half or less.

Rake angles for turning aluminum will vary according to alloy content. The softer, more ductile materials will need the larger rake angles. Rake angles of 10° and lower will suffice for the higher strength alloys of free machining quality.

Tips On Angles — The cutting angle should be on the high side for both heat-treatable alloys and those containing high silicon. Less cutting angle is needed for the

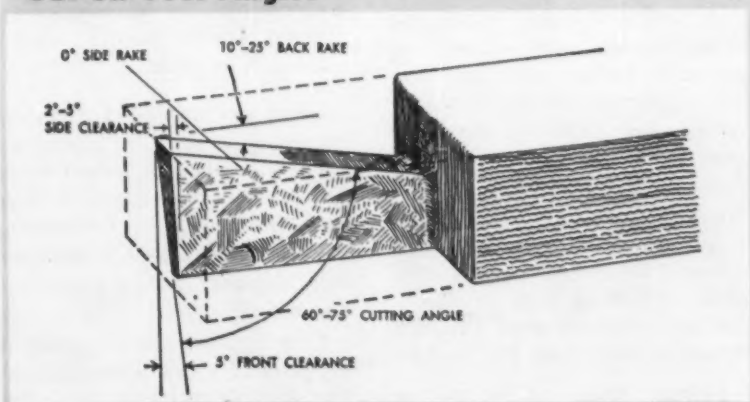
materials that are not heat-treatable. This angle will range between 35° to 55° for carbon and high-speed tools. Carbides require cutting angles of from 50° to 80°.

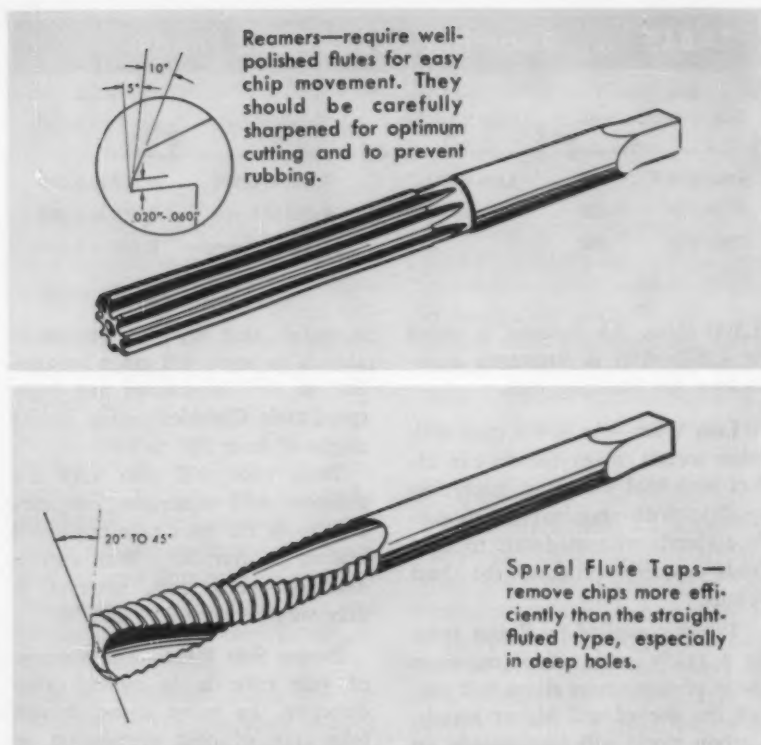
Back rake will also vary for different tool materials. For carbide tools, the back rake angle will seldom go over 30°. With carbon and high-speed tools, however, it may vary between 25° and 50°.

Proper Side Rake—The purpose of side rake is to control chip direction. In many cases, it will take care of chip elimination in place of a chip breaker. The actual cutting action of the tool is fixed by the combination of top and side rake angles along with the contour of the tool nose. Round-nosed tools work well on aluminum. They can be varied at points along the cutting edge to get the true rake for different cutting operations. Side rake angles will vary between 10° and 20°.

Front clearance is very important. Frequently, it is determined by trial, although it must not be insufficient or excessive if

Cut-off Tool Angles





work hardening and chatter are to be avoided. With carbon and high-speed steels, a front clearance of from 7° to 12° is considered normal. A range of 6° to 10° is recommended for carbide cutters.

Side Clearance Angles — Side clearance for carbon and high-speed turning tools should run about 7° to 12°, occasionally slightly higher. Carbide tools will run from 8° to 10°. The side clearance is equal to effective front clearance and should serve to keep the workpiece from coming in contact with the flank of the tool.

According to Kaiser experts, the carbide-tipped tools should be ground to smaller rake angles than those preferred for high-speed or carbon steel tools. A zero rake angle can be used with carbide tools if stock surface speed is lowered. To properly support the tool tip, a lip angle of from 65° to 80° is desirable for heavy cuts in harder alloys and those high in silicon. For lighter cuts on softer materials, try an angle of from 50° to 55°.

Drilling Hints — In drilling

aluminum, use a sharp drill and an even feed. The combination will help produce a uniform chip. Although aluminum can be drilled with standard drills, drills with a greater spiral angle (40° to 50°) will provide easier cutting. The greater angle also disposes of chips more readily. For thin stock, smaller spiral angles are suitable.

To cut properly, the cutting edges of a drill must have sufficient clearance. With aluminum, the angle of clearance is usually over 12° and may be as high as 17°. Point angle should be adjusted to conform with the hardness of the material. Harder materials require a flatter point angle.

Sharp and Smooth—For efficient cutting, drills must be ground accurately and have a smooth finish. An acceptable finish can be obtained by careful honing without changing the grind angles. Such a finish not only improves cutting action but also reduces drag.

Chip breakers can be ground in the point of a drill when required. The breaker serves to cause the

chip to curl onto itself and break. It should be made as shallow as possible.

Aluminum can be reamed with a variety of standard reamers, but the tools with spiral flutes seem to work best. After grinding, the reamer should be oil-stoned to produce a polished finish. This type finish is especially recommended for aluminum.

To Sharpen Reamers—A highly delicate operation, reamer sharpening should be handled by a machine with micrometer adjustments. The part of the reamer that does the actual cutting is the chamfer angle. This should be uniformly ground on each flute. Sufficient clearance should be allowed for behind the chamfered cutting edges.

When a reamer is sharpened, enough stock is usually removed to reduce it to a smaller size. A fine, free-cutting wheel should be used for sharpening. Care must be taken to avoid burning the cutting edges. Any burning will reduce tool life and produce a rough edge.

Best Speeds—As a general rule, reamer speeds are about 60 to 70 pct those used for drilling. Feeds are about the same or higher. This applies to reamers and drills of approximately the same diameter. It does not take into consideration other qualifying factors such as alloy grade, finish required, and the shape of the part.

Because reamers are expensive, precision tools intended for close tolerance work, they should be handled with extra care. Here are six simple rules for keeping reamers in good condition:

1. Keep them oiled when not in use.
2. Never stock them in bins or boxes without separators.
3. Store them in individual tubes if possible.
4. Handle them with extra care.
5. Provide a special rack near the machine for holding reamers that are not in use.
6. Keep them ground and sharpened at all times.

Tap Carefully—Relieved threads are recommended for taps to be used on aluminum. Such threads avoid galling and loading up. They have the disadvantage, however, of being more easily forced sideways or otherwise distorted in motion. This means that tapping must be planned and executed with a little extra care if proper dimensioning is to be obtained.

Tap flutes should be undercut with a top rake of from 10° to 20° at the leading edges. They should be deep, wide, and well polished for easy chip clearance. Small flutes often cause binding due to packing of the chips in the threads.

Spiral Flutes — Straight fluted taps can be used for most aluminum alloys. For better results, the spiral fluted types are recommended — especially for softer alloys.

Broaching aluminum generally calls for the use of higher speeds, increased shear angles on surface broaches, greater cuts per tooth, adequate clamping, and proper coolants. Advantages of broaching include economy and the speed and precision of the operation. The trend is toward the wider use of broaching, even for smaller aluminum parts.

Broaching Speeds — Depending upon machine capacity, the average broaching speeds for aluminum will vary between 80 to 100 sfp. Some units, however, are designed to operate at triple this speed. As is the case with other cutting operations, factors such as shear angles, cut per tooth, and type of work-piece are likely to influence maximum operating speed.

Clearance angles on broaches should be kept below 3° for roughing. Even smaller angles should be used for finishing. This will avoid loss of size when the tool is sharpened. A 15° to 20° rake angle is considered adequate. Side rakes may vary between 8° and 20° in external broaching. This range will contribute to a better finish with less vibration.

Proper Clamping—To guarantee

accuracy and smooth operation, parts for broaching must be rigidly clamped. But because aluminum is relatively soft and ductile, clamping pressure should always be applied to heavy sections whenever possible. This will help to avoid the possibility of distortion.

Among the coolant-lubricants used in connection with aluminum broaching are kerosene and lard oil and a variety of mineral oils. These should be fed at low pressure in generous quantities. Use of cutting fluids definitely improves surface finish. They also prevent sticking, keep the tool cool, reduce friction, and promote tool life.

Improved Grinding — Wheel

loading, excessive heating, and poor surface finishes were the prime drawbacks of grinding aluminum. In terms of modern practice, this is no longer the case. Correct operating procedures have solved all of these problems.

First of all, grinding aluminum calls for the use of special types of wheels. Secondly, work speeds are about twice as fast as those used on steel. Depth of cut is on the shallow side. Lastly, of course, is the use of a proper lubricant.

Wheels used for grinding aluminum need a coarse grit, an open structure, and should be of a soft grade. A typical specification applies to a silicon carbide wheel with vitrified bonding.

TABLE IV | Threading Speeds

| Diameter of Work, in. | Threads Per Inch | | | |
|--------------------------|--------------------|------|-------|-----------|
| | 3-8 | 9-15 | 16-22 | 21 and up |
| | Surface Speed, fpm | | | |
| | 200 | 250 | 325 | 475 |
| 1/8 | 6120 | 7649 | 9930 | 14505 |
| 1/4 | 3059 | 3820 | 4960 | 7250 |
| 3/8 | 2040 | 2545 | 3319 | 4845 |
| 1/2 | 1530 | 1910 | 2485 | 3630 |
| 5/8 | 1225 | 1530 | 1990 | 2910 |
| 3/4 | 1015 | 1272 | 1652 | 2419 |
| 7/8 | 874 | 1092 | 1420 | 2074 |
| 1 | 763 | 953 | 1240 | 1810 |
| 1 1/4 | 612 | 765 | 993 | 1451 |
| 1 1/2 | 509 | 638 | 829 | 1210 |
| 1 3/4 | 438 | 548 | 711 | 1038 |
| 2 | 382 | 477 | 622 | 907 |
| 2 1/4 | 340 | 425 | 552 | 807 |
| 2 1/2 | 306 | 383 | 497 | 727 |
| 2 3/4 | 278 | 348 | 452 | 660 |
| 3 | 255 | 319 | 415 | 606 |
| 3 1/4 | 235 | 294 | 382 | 557 |
| 3 1/2 | 218 | 273 | 355 | 517 |
| 3 3/4 | 204 | 255 | 332 | 486 |
| 4 | 191 | 238 | 310 | 454 |
| 4 1/4 | 180 | 225 | 292 | 427 |
| 4 1/2 | 170 | 214 | 276 | 405 |
| 4 3/4 | 161 | 201 | 261 | 382 |
| 5 | 153 | 191 | 248 | 362 |

* Geometric Tool Company Division.

Magnesium is Easy to Work With

Combining light weight, good corrosion resistance, and excellent machinability, magnesium continues to grow in popularity.

This handy guide spells out the best machining methods along with precautions that must be followed.

■ As the lightest common structural metal, magnesium has been gaining increased attention in recent years. Its expanding use has followed an impressive up-hill spiral. Its light weight obviously is one of its major selling points. It is only one-quarter as heavy as iron and steel and is considerably lighter than aluminum.

Even so, it is doubtful whether magnesium would have prospered as well if its virtues were limited to weight considerations alone. Used in alloy form, it provides a range of versatile properties. Common alloying elements added to increase magnesium's strength and other properties include aluminum, manganese, zinc, and zirconium.

Resists Corrosion—Where costly

machining is a problem, magnesium has the advantage of being possibly the easiest of metals to machine. It has good stability in air and resists chemical attack by alkalis, chromic and hydrofluoric acid, hydrocarbons, aldehydes, alcohols, phenols, amines, esters, and many types of oil. It is nonmagnetic, of course, and is a good conductor of both heat and electricity.

Magnesium alloys can be machined at extremely high speeds without sacrificing either depth of cut or rate of feed. According to Dow Chemical tests, high-speed steel tools last as long in cutting magnesium as carbides do in machining other metals. Free-cutting characteristics, low power requirements, and excellent surface finish are other advantages claimed by users.

General Rules—As is the case with other alloys, magnesium alloys provide a variety of mechanical properties. Consequently, their machining characteristics can be expected to vary to some extent. But before covering specifics, it is wise to keep in mind the following gen-

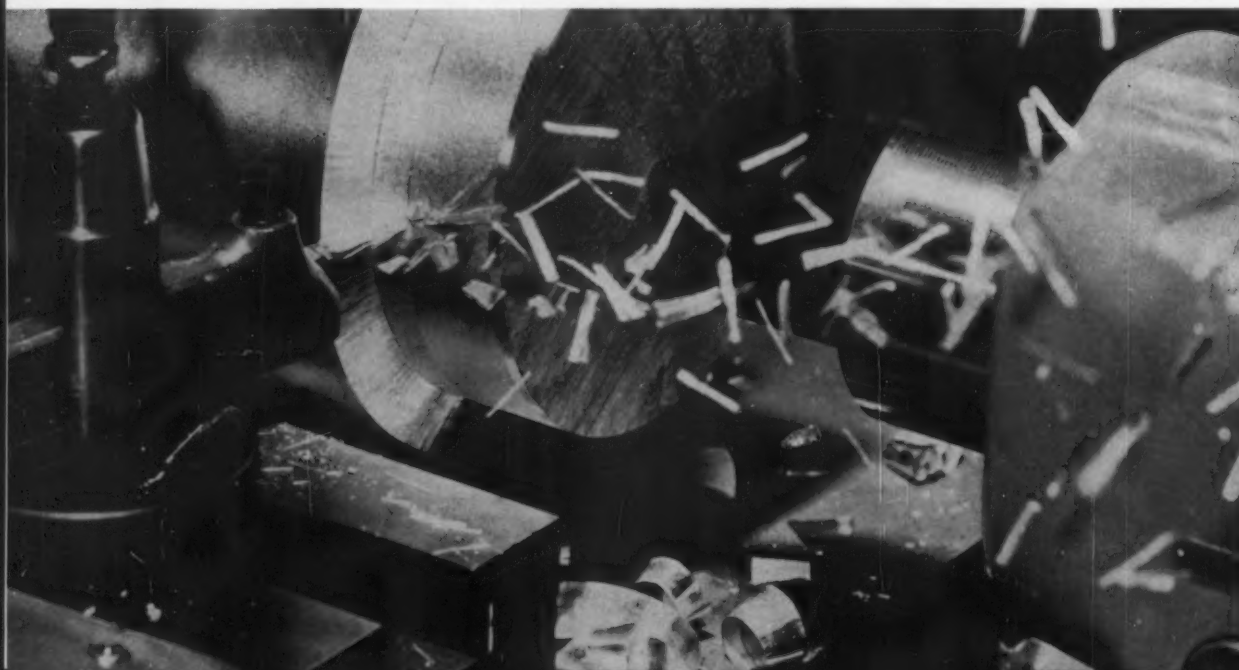
eral rules formulated by Dow engineers:

1. For cutting magnesium, keep all cutting tools sharp and ground with adequate relief and clearance angles.
2. Use heavy feeds to produce thick chips.
3. Use mineral oil coolants (4 to 5 gallons per minute) whenever possible. Otherwise, avoid fine cuts and keep speed below 500 sfpm.
4. Do not allow chips to accumulate on machines or clothing of operators. Remove dust and chips at frequent intervals and store in clean, plainly labeled, covered metal cans.
5. Keep an adequate supply of a recommended magnesium fire extinguisher within reach of the operators.

In Case of Fire—If a magnesium fire should occur, here's how to take care of it:

1. Scatter a generous layer of either finely powdered graphite or

Below: Magnesium lends itself to high-speed turning, is among the easiest metals to machine. (Dow Chemical Co.)



clean, dry cast iron chips, dry sand, or powdered talc.

2. Actively burning fires on combustible surfaces like wood floors should be covered with a layer of the powdered graphite. Then the entire mass should be shoveled into an iron container or onto a piece of iron plate.

3. Water or any of the common liquid or foam-type extinguishers will intensify a magnesium chip fire and are not recommended for use by machine tool operators.

Critical Angles—In turning magnesium, it is essential that relief angles be made large enough to avoid rubbing of the tool flanks. There is no set rule regarding rake angles. But recommended practice on high speed steel tools calls for side and back rake angles of 0° to 15°. Slightly smaller angles are preferred for carbide tools.

In order to eliminate chatter, the back rake angle of forming tools is held between 0° and 8°. Side cutting angles that exceed 40° are likely to cause chatter. To avoid rubbing on the end of the tool, nose radii should be small.

Moderate Feeds—In regular shop practice, depths of cut as high as 0.500 in. and feeds from 0.003 to 0.200 in. are not uncommon. A heavy feed serves to remove a lot of metal but it will not result in optimum surface finish. In the interests of a good finish, feeds should not exceed about 0.025 in.

With magnesium, a fine cut will heat the work more than a heavy cut. Extremely fine cuts should be avoided. This may require a little extra planning but it is the safest practice.

Easy Cutting—Almost any cutting speed can be used, depending upon the capabilities of the machine. In some cases, cutting speeds may run as high as 5000 sfpm and produce satisfactory work. In general, it is good practice to turn and bore magnesium as fast as the machine tool and other factors will allow.

Rules for shaping and planing are pretty much the same as those that apply to turning and boring. It is permissible to deviate from standard tool shapes. The only qualification that must be adhered to is allowance for adequate relief angles and keeping cutting edges sharp.

Use Little Power—Cutting speeds for shaping and planing are generally lower than those used for turning and boring. To make these operations more economical, simply increase feed and depth of cut. With magnesium, this is no problem be-

Turning Tools Magnesium

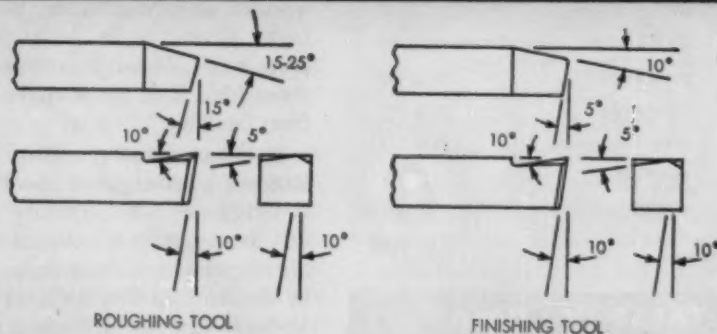


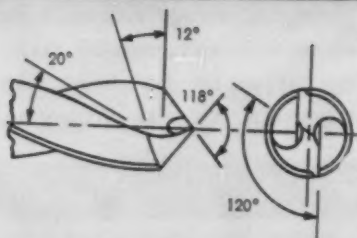
TABLE I | Turning, Boring: Speeds, Feeds Depth of Cut

| Operation | Speed, fpm | Feed, ipr | Maximum Depth of Cut, in. |
|-----------|--------------|----------------|---------------------------|
| Roughing | 300 to 600 | 0.030 to 0.100 | 0.500 |
| | 600 to 1000 | 0.020 to 0.080 | 0.400 |
| | 1000 to 1500 | 0.010 to 0.060 | 0.300 |
| | 1500 to 2000 | 0.010 to 0.040 | 0.200 |
| | 2000 to 5000 | 0.010 to 0.030 | 0.150 |
| Finishing | 300 to 600 | 0.005 to 0.025 | 0.100 |
| | 600 to 1000 | 0.005 to 0.020 | 0.080 |
| | 1000 to 1500 | 0.003 to 0.015 | 0.050 |
| | 1500 to 2000 | 0.003 to 0.015 | 0.050 |
| | 2000 to 5000 | 0.003 to 0.015 | 0.050 |

TABLE II | Milling: Speeds, Feeds and Depth of Cut

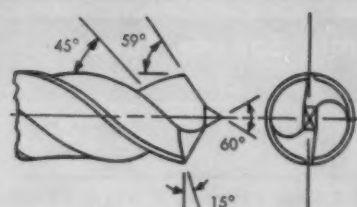
| Operation | Speed, fpm | Feed | | Depth of Cut, in. |
|-----------|--------------|-----------|----------------|-------------------|
| | | in./min. | in./tooth | |
| Roughing | up to 900 | 10 to 50 | 0.005 to 0.025 | up to 0.500 |
| | 900 to 1500 | 10 to 60 | 0.005 to 0.020 | up to 0.375 |
| | 1500 to 3000 | 15 to 75 | 0.005 to 0.010 | up to 0.200 |
| Finishing | up to 900 | 10 to 50 | 0.005 to 0.015 | up to 0.075 |
| | 1000 to 3000 | 10 to 70 | 0.004 to 0.008 | 0.005 to 0.050 |
| | 3000 to 5000 | 10 to 90 | 0.003 to 0.006 | 0.003 to 0.030 |
| | 5000 to 9000 | 10 to 120 | 0.002 to 0.005 | 0.003 to 0.030 |

TABLE III | Shallow Hole Drill Data



| Drill Element | Recommendation |
|-------------------|----------------|
| point angle | 70 to 118° |
| helix angle | 10 to 30° |
| chisel edge angle | 120 to 135° |
| relief angle | 12° |
| corners | rounded |
| flutes | polished |

TABLE IV | Deep Hole Drill Data



| Drill Element | Recommendation |
|-------------------|--------------------|
| point angle | 118° |
| helix angle | 40 to 50° |
| chisel edge angle | 135 to 150° |
| web | constant thickness |
| flutes | open and polished |
| point | 118° plus spur |

cause power requirements are low.

Because shaping and planing operations do not tend to generate much heat, coolants are usually not required. By lifting the tool block on the return stroke of the ram, it is possible to avoid dragging the tool over the work surface. This will prevent scoring the surface on finish cuts and provide a smooth surface finish.

Three separate types of drills should be used for magnesium. One type should be used exclusively for sheet metal, another for drilling

shallow holes, and a third for deep holes. (By shallow holes is meant any hole whose depth is less than five times the drill diameter.) Standard steel drills can be used for shallow holes.

Modify Drills—For drilling sheet and deep holes, modifications of standard drills are preferred. A sharp, 118° point angle drill will work on magnesium sheet. But for higher production and better finish, point angle should be reduced to about 60°. This will keep the drill from "walking."

In shallow-hole drilling, the standard helix angle of about 25° is satisfactory. It may vary from 10° to 30°. Highly polished flutes are recommended. Point angles may be the standard 118°. Chisel edge angles of 120° to 135° with a relief angle of about 12° provide good cutting action.

Deep-hole Drilling—High-helix drills (40° to 45°) are best for deep-hole drilling. The web of the drill should have a constant thickness for its entire length. Flutes should be opened and polished. Chisel edge angles of 135° to 150° are essential. A spur point ground at the center of the drill will greatly reduce spiralling.

It is possible to use drilling speeds of up to 2000 sfpm on magnesium. Actually, the higher speeds contribute to both accuracy and surface finish. However, the normal range of drilling speeds is between 75 and 400 sfpm. Feeds should be heavier than those used for other metals.

Check Reamer Details—Reamers with fewer-than-normal flutes will work best on magnesium. Under 1 in. diam., reamers should have four flutes. Six flutes is required for reamers over 1 in. diam. Flutes may be straight or with a negative helix angle of about 10°.

Reamer margins should be narrow. Margin-less reamers provide free cutting. A wide range of reaming feeds can be used. Cuts should

not be too shallow. In most cases, a 1/32 in. cut on a diameter is about adequate. Heavier cuts may jam the chips in the flutes. Cutting speeds will vary from 100 to 400 sfpm.

If very close tolerances are not required, magnesium may be tapped with standard taps. For closer tolerances and higher production rates, special taps must be used. Made of high-speed steel, these are the straight or helical fluted concentric type.

Types of Taps—For holes up to 1/4 in. diam., two-fluted taps are adequate. Between 1/4 and 3/4 in. diam., three-fluted taps are preferred. Four-fluted taps should be used for larger holes. Speeds of 75 to 200 sfpm represent the normal range. Use of a mineral oil coolant makes tapping easier.

Threading dies with the same cutting angle as taps are recommended. The narrowest possible land is best for chip clearance. For maximum smoothness, use self-opening dies. The cutting angles used on turning tools also apply to thread chasers. Threading speeds may run as high as 1000 sfpm.

High-Speed Milling—For milling magnesium, high speed steel milling cutters of all types can be used at maximum speeds and feeds. Cemented carbides are better for inserted tooth face mills and fly cutters. Slab, side cutting, and straddle mills should be coarse toothed. They should have from one-half to one-third as many teeth as mills used for steel.

Very high cutting speeds—up to 9000 sfpm—can be employed in milling magnesium. Feeds and depth of cut will vary, depending upon a number of factors. It is possible to appreciably reduce the amount of heat generated in machining by starting out with heavy roughing cuts, then finishing with fine cuts at maximum speed.

Variety of Saws—To saw magnesium, a variety of types of equipment may be used. Among them

are band and circular saws, hand saws, and power hack saws. But to remain free cutting, saw blades must be provided with larger chip spaces. Too small a tooth pitch will cause the blade to ride over the work.

While no particular set is preferred for the teeth of a circular saw, teeth on both band and hack-saws must be large. Make sure that the relief angles on circular saw teeth are on the generous side. This helps to minimize friction.

Sawing Feeds—As for high-speed steel circular saws, these can be used if they have all straight teeth or if teeth are alternately bevel and straight mill teeth. Despite the slower operating speeds, these saws have the advantage of longer life and easier cutting.

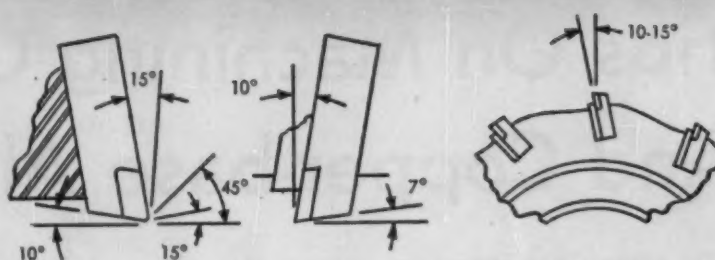
It is difficult to generalize about sawing feeds. Peripheral speeds for circular saws, however, should be held at about 2000 ft. or less. When circular saws are used, it is possible to achieve feeds up to 120 ipm. Because of lower power requirements, saw feeds should be generally higher for magnesium than for many other metals.

Files and Burrs—Rotary files (or burns) are frequently used to file magnesium. Typical applications include the cleaning up of castings and the smoothing of irregular surfaces. Burrs should be of the coarse cut type with few cutting edges and deep flutes. Chromium plating improves abrasion resistance and extends the life of burrs. Depending upon size, these tools can be operated at speeds of 4500 to 7000 rpm.

Hand files used on magnesium should be coarse. Both single and double cut files work satisfactorily. Smooth cut files can be employed under light cutting pressures. Heavy cuts will cause these files to load up.

Remove Flash—There is virtually no reason to ever finish grind magnesium. After finish machining, surfaces should be sufficiently smooth and accurate to require no further operation. Rough grinding, however, is commonly resorted to

Inserted Tooth Face Mill



in the foundry and forge shop. It serves to remove flash and clean up rough surfaces.

For this purpose, medium to coarse grained, medium-hard grinding wheels work best. For rough grinding, use a grain size of 20 to 40. A finer finish can be obtained with a grain size of 40 to 70. In any case, always choose the coarsest grain that can be tolerated. This will insure maximum efficiency and reduce wheel loading to a minimum.

Beware of Dust—Always grind dry when possible and provide adequate facilities for dust collection. Some finer grinding can be done

with a mineral oil lubricant. The combination of grinding dust and lubricant will form a sludge which can be collected in a bin.

It is essential that metal dust be collected in some kind of wet type dust collection system. This rule applies to both grinding and polishing. Because of the fine particle size, magnesium dust can be especially hazardous and should be treated with appropriate caution.

Make sure you're familiar with all safety precautions that pertain to the grinding of magnesium. Then see to it that they are followed to the letter.

TABLE V Saws for Magnesium

| | Circular Saw | | Band Saw | Power Hacksaw | Hand Hacksaw |
|---------------------|----------------|---------------|-----------|---------------|--------------|
| | Straight Teeth | Beveled Teeth | | | |
| pitch-in teeth/inch | 1/2-4 | 1/2-4 | 4-8 | 2-6 | 12-18 |
| tooth set inches | none | none | 0.02-0.05 | 0.015-0.03 | — |
| end relief angle | 9-11° | 9-11° | 10-12° | — | — |
| side relief angles | 1-1 1/2° | 1-1 1/2° | — | — | — |
| clearance angle | 20-30° | 20-30° | 20-30° | 20-30° | 20-30° |
| rake angle | 16-20° | 15-20° | — | — | — |

Tips On Machining Copper And Copper-base Alloys

The coppers and brasses are widely used for a variety of screw machine applications.

Most of these alloys have a high machinability rating. But for top efficiency, tooling should be designed to fit the needs of the individual alloy.

■ There are five major classes of copper-base alloys—most of them very well known to fabricators in the metalworking industry. They are the coppers, the non-lead brasses, the lead brasses, high strength alloys, and nickel silvers. Each class is made up of a number of materials with special and distinct properties. That's the main reason why the machining copper-base alloys—as a family of materials—doesn't lend itself to generalization.

Conductivity and Strength—There are a number of grades of coppers,

but all of them have high electrical conductivity. Although not too easy to machine, electrolytic tough pitch copper is unalloyed and rates highest in electrical conductivity. Three free-cutting grades of copper are far easier to machine. They are tellurium copper, selenium copper, and leaded copper. A tellurium-nickel-copper is rated as a high strength alloy and is widely used in marine hardware.

Commercial bronze and cartridge brass are the two principal non-lead brasses. Along with good corrosion resistance, these alloys have good cold working characteristics. Their machinability rating is on the low side. Among the applications for which they are particularly suited is the making of rivets and other types of mechanical fasteners.

Cuts Easily—Free-cutting brass has a very high machinability rating and is ideal for the making of automatic screw machine parts. Along with high-lead and medium-lead brass, these are alloys to which lead has been added in order to improve machinability. Architectural bronze belongs to the same family and has good extrusion characteristics. Lead commercial bronze combines good corrosion resistance with improved machinability.

Among the high strength alloys, leaded naval brass is known to machine well and stand up against salt water corrosion. Naval brass is closely related to this alloy but does not rate as high in terms of machinability. Manganese bronze has even

greater strength and hardness but is still more difficult to machine.

Resists Wear—The phosphor bronzes are also included among the high strength alloys. In addition to high tensile and fatigue strength, these materials have good wear and corrosion resistant qualities. For excellent machinability, there is a free-cutting grade of phosphor bronze. A lead grade is rated as moderately machinable.

Standard phosphor bronze has relatively poor machining qualities but makes up for this deficiency by virtue of its excellent cold working characteristics. For severe cold working, a low-silicon bronze is recommended. For hot working and superior resistance to stress corrosion, a bronze containing both silicon and aluminum is preferred.

Without Silver—The alloys known as nickel silvers actually do not contain silver. They come by their name because of their silvery color. They contain copper, nickel, and zinc. They combine high strength with good corrosion resistance and attractive appearance. Lead nickel silvers are easier to machine and can be identified by their somewhat yellowish color.

Many of the coppers and copper-base alloys are "tempered" to a given hardness level. In connection with these materials, "temper" means the reverse of what it means in relation to steel. A tempered copper-base alloy is one whose hardness has been increased by cold working. A tempered steel, on the other hand, is a material whose hardness has been lowered from the as-quenched hardness level.

Different Tempers—When cop-



Left: Free-cutting brass has a high machinability rating, is ideal for screw machine parts. (American Brass Co.)

per-base alloys are intentionally softened, they are said to be in the "annealed temper" condition. Other degrees of relative hardness are referred to as light cold worked temper (or quarter hard), half hard temper, and hard temper.

How well do the coppers and copper-base alloys machine? This question, according to the Copper and Brass Research Association, is not readily defined.

"Most machining involves operations in which either the rod or the tool revolves and the machining operation is performed on the circumference of the rod and at right angles to the longitudinal axis. Exceptions to this, generally secondary operations, are such operations as slatting and cross drilling.

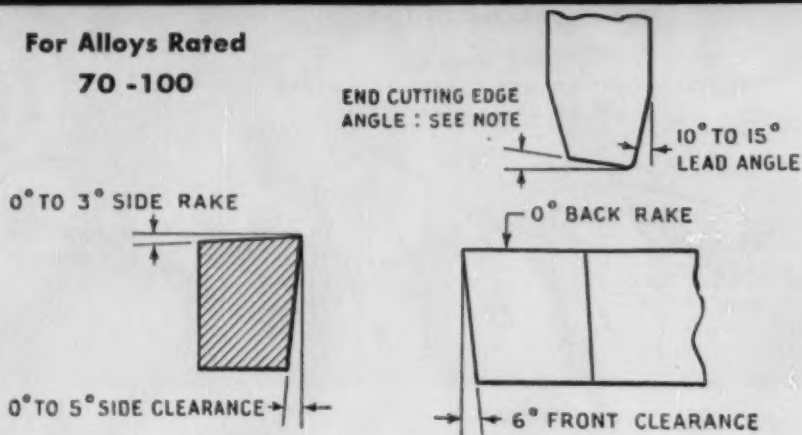
Special Qualities—"Copper and each of its alloys have individual characteristics as to ductility, hardness, tensile strength, type of chip produced, etc. Metal to be machined must be rigid enough to stand up against the turning tool without distortion. This requires a temper in the wrought copper alloys for automatic screw machining, yet the alloys may need to be soft enough to withstand other subsequent cold working.

"The varying characteristics make it impossible to clearly define speed, rate of feed, and form of tool to be used in machining, whether it be a single-point tool, form tool, milling cutter, drill, tap, chaser, reamer, or saw. However, it is possible to group copper and its alloys into classifications and to set up broad ranges of speeds, feeds and rake and clearance angles within each classification."

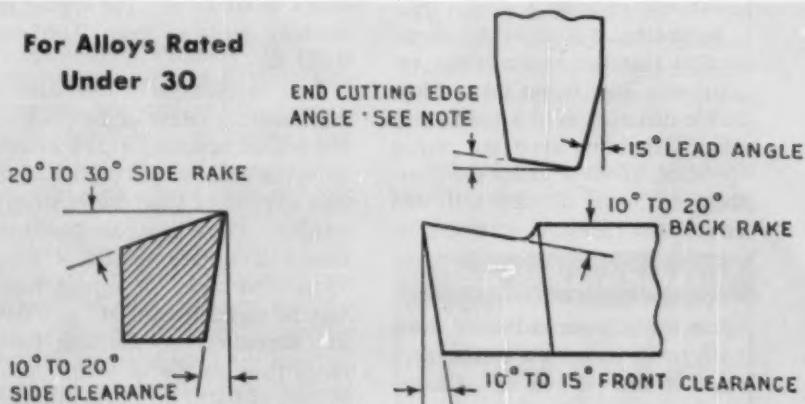
Tools To Use—Regarding the types of tools to use on copper-base alloys, the experts consider carbon steel satisfactory on short runs where machining at higher speeds is not required. These tools will lose some hardness, however, at the temperatures generated by machining at high speeds. Consequently, high-speed steel and car-

Turning Tool Guide for Copper and Alloys

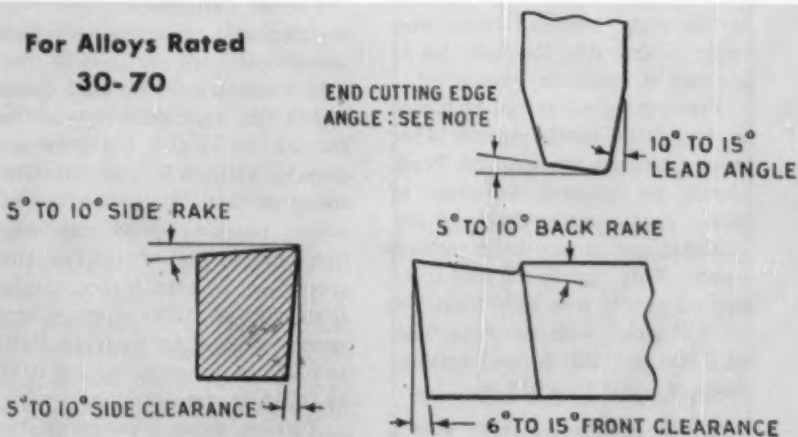
For Alloys Rated 70-100



For Alloys Rated Under 30



For Alloys Rated 30-70



NOTE: An 8° to 15° end cutting edge angle should prove satisfactory for most rough and finish turning operations. When the end cutting edge of a finishing tool is ground with a drag, or parallel with the axis, considerably

heavier feeds may be employed on light finishing cuts. Tools should be ground and set so that the tool point is on center with the effective rake angles in correct relation to the center line of the work.

Drill Point and Clearance Angles

For Alloys Rated 30-100

0° RAKE ANGLE
FLATTEN CUTTING EDGE APPROXIMATELY
6-8% OF DRILL DIAMETER



For Alloys Rated Under 30

USE FULL RAKE ANGLE
DO NOT FLATTEN CUTTING EDGE



bides must be used to fill the more severe requirements.

In turning, it is important to remember that the harder alloys require very little or no rake. More ductile materials need a fairly steep rake. Depending upon the cutting operation, however, rakes and clearances are likely to vary with tool shape, nose radius, or front cutting edge angles.

Avoid Chatter—For rough cuts, figure on a nose radius of from 1/16 to 1/8 in. with a cutting edge angle of from 8° to 15°. Chatter is often the result of too large a nose radius or too small an end cutting angle. Less end cutting edge angle is desirable for light finishing cuts at moderate speeds.

Free-cutting alloys can be turned at very high spindle speeds when small diameters are involved. Feeds should be adjusted in terms of power requirements, depth of cut, coolants, and surface finish requirements. With high-speed steel tools, surface speeds may vary from 300 to 700 sfpm, with roughing feeds of 0.006 to 0.020 in. and finishing feeds of 0.003 to 0.015 in.

Lower Speeds—Alloys with a rating of between 30 and 70 (including non-leaded brasses, leaded phosphor bronze, and leaded nickel silver) call for different turning conditions. With these less machinable materials, surface speeds should be held to about 150 to 300 sfpm.

Roughing feeds will range from 0.015 to 0.035 in. The spread of finishing feeds is from 0.005 to 0.015 in.

Less machinable alloys with a machinability rating of 20 (such as non-leaded coppers, nickel silvers, phosphor bronzes, and cupro nickel) tend to produce long, tough, stringy turnings. These materials should be turned at surface speeds of from 75 to 150 sfpm. Roughing feeds may be varied from 0.015 to 0.040 in. Recommended finishing feeds range from as low as 0.005 in. to as high as 0.020 in.

Use of Carbides—So much for the conditions applicable when high-speed steel tools are used in turning. When carbides are used, speeds and feeds can generally be increased. In turning the more machinable alloys with a machinability rating of from 70 to 100, for example, roughing speeds can range from 400 to 800 sfpm. Finishing speeds can go even higher, ranging from 500 to 1000 sfpm. Corresponding ranges for feeds are: 0.015 to 0.025 in. for roughing and 0.005 to 0.015 in. for finishing.

Turning those alloys with machinability ratings of from 30 to 70 calls for roughing speeds of from 300 to 500 sfpm with feeds of 0.015 to 0.030 in. Recommended finishing speeds are from 400 to 600 sfpm with feeds of 0.005 to 0.015 in.

Speed Ranges—With the tougher-to-machine materials whose machinability rating is less than 30, try roughing speeds of from 250 to 600 sfpm. Roughing feeds should be held within the range of 0.015 to 0.030 in. Suitable finishing speeds are likely to vary from 300 to 800 sfpm with feeds of from 0.008 to 0.015 in.

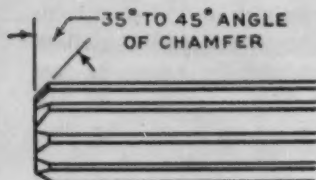
Although standard drills can be used with most of the copper-base alloys, specially designed, high speed steel drills are often used in production. For the more machinable alloys (with ratings of over 30), flat and straight-flute drills with zero-degree rake angle are commonly used for screw machine work.

Drilling Pointers—Other high-speed drilling operations make use of the slow-spiral or "brass" drill. This type of tool has a decreased helix angle ranging from 10° to 22°. It has wide, polished flutes and a thin web. The combination provides for ample chip clearance with a decreased rake angle. These tools are especially suited for deep-hole drilling.

How about drilling the least machinable alloys? For these, a high-spiral drill seems to work best. Its helix angle should be about 40°. American Brass Co. experts note that the greater number of twists per inch provides the desired increased rake angle and assists in

Reamer Angles and Clearances

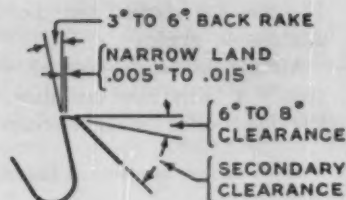
For All Groups



For Alloys Rated 70 -100



For Alloys Rated Under 70



ejecting chips, particularly in deep drilling.

Try Lubricants—As a general rule, almost any copper-base alloy can be drilled better when a suitable lubricant is used. This is particularly true of screw machine work. Lubricants become far more essential when it comes to drilling those alloys with machinability ratings of less than 30.

A great deal of production drilling is done with the standard, hand-fed drill press. With these machines, feeds will usually exceed those used for even mild steel. Some alloys—such as aluminum bronze—tend to work harden. When drilling these materials, make sure the drill cuts continuously. This will avoid glazing. Back off the drill occasionally to relieve the chips.

Feeds Will Vary—Drilling speeds will vary according to the relative machinability of the alloys. The most machinable materials can be drilled at speeds of from 200 to 500 sfpm or more. The least machinable alloys, including copper, are limited to a practical speed range of 50 to 125 sfpm.

In drill sizes from $\frac{1}{8}$ to $\frac{3}{4}$ in., feeds will vary from 0.003 to 0.020 in. Lighter feeds are recommended with the smaller diameter drills, for deep holes, and for maintaining a high degree of dimensional accuracy. With the aid of pressurized lubricants, it is possible to go to

much heavier feeds with large diameter.

Spiral-Flute Reamers—In reaming copper-base alloys, there is a tendency for straight-flute reamers with narrow lands to chatter. This can be avoided by using spiral-flute reamers with a helix angle of about 7° to 12°. For free cutting and a smooth finish, left-hand spiral, right-hand cut reamers are strongly recommended. These can be used for either straight or tapered holes. By leaving sufficient stock for reaming, you will avoid undesirable burnishing action.

Reaming speeds for more machinable alloys may go as high as 200 sfpm. For the tougher materials, it is wise to reduce speed down to the range of 60 to 90 sfpm. Feeds are about two or three times those used for drilling. Spiral reamers work best on the less machinable alloys.

Tight Fits—In tapping, it is essential to select a tap drill that is not too small or too close to the size of the root diameter. Too tight a fit is the major cause of torn threads and broken taps. Usually, a 75 to 80 pct depth of thread does an acceptable job.

Regular, commercial taps can be used for most hand tapping operations. These can be made of either carbon or high speed steel. For machine tapping, it is best to use high speed steel taps with ground

threads. Try spiral-pointed taps with two or three flutes for the less machinable copper-base materials. Always provide an adequate supply of cutting lubricant for all tapping operations.

Tapping Rules—Tapping speeds depend upon the relative machin-

Tap Rake Angles

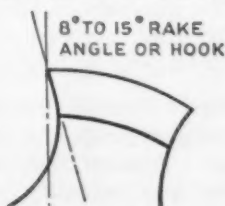
For Alloys Rated 70 -100



For Alloys Rated 30- 70



For Alloys Rated Under 30



ability of the alloy and the thread pitch. Coarse-pitch threads always require the lower speeds. In general, however, the more machinable grades can be tapped at speeds of from 150 to 250 sfpm. This range must be cut down to 30 to 60 sfpm for copper and the less machinable grades.

Milling the copper-base alloys is usually a fairly easy operation. A few simple rules should be observed.

The clearance behind the cutting edge of the milling cutter should be great enough to avoid a burnishing action. Too much clearance or excessive cutting speeds will produce chatter.

Milling Cutters — Coarse-tooth spiral cutters with a helix angle of 20° to 30° perform nicely on most copper-base alloys. Helical cutters with a helix angle up to 50° are

also recommended. For deep-slotting operations on the less machinable grades, try staggered-tooth side milling cutters with alternate spiral teeth. Spiral-fluted end mills also do a good job.

With suitable cutting fluids, milling speeds on the machinable alloys may go as high as 250 sfpm, with only slightly lower speeds for alloys with machinability ratings as low as 30 or 40.

■ How To Get More for Your Machining Dollar | Section 4

Guide To Machining Titanium

If you're willing to follow the proper procedures, the machining of titanium and titanium alloys can be made a lot simpler and more profitable.

Here are some useful pointers on the machining operations most often encountered.

■ Even when tackled by experts, the machining of titanium is at times a formidable problem. Still, there is plenty of evidence that the magnitude of the problem may have been grossly exaggerated. So that, at the moment, titanium's bark is far more formidable than its bite.

There are a number of reasons for the "fear complex" that now enshrouds the machining of titanium. Perhaps the most significant is that titanium did not follow in the gradual steps afforded the introduction of most new and unfamiliar materials. It was thrust upon the scene as a kind of king-sized "crash program."

Emphasize Aircraft—Obviously, there was some justification for this approach. Titanium was widely publicized as a spectacular aircraft material. And the aircraft industry,

as a rule, subjects virtually all of its problems to the crash-program-type solution. Whatever the intention, this did little to enhance the reputation of titanium in the machine shop.

By now we know that the machining of titanium is neither simple nor insurmountable. It involves engineering and shop problems that can be solved and have been solved by careful and systematic analysis. In retrospect, we can appreciate the dilemma faced by those pioneers who were expected to solve all aspects of machining titanium "overnight."

Titanium's Status—The present status of fabricating titanium was recently summarized in a comprehensive report issued by the Titanium Metallurgy Laboratory, Battelle Memorial Institute. According to the report, "titanium is fulfilling an engineering need, particularly in military aircraft, and in spite of many fabricating problems, titanium parts are being successfully integrated into production schedules with aluminum and steel-metals which have long been well established in industry."

The same report emphasizes the fact that "titanium is an expensive

metal; the price of its mill products ranges from \$7.25 to \$15.75 per pound." With this in mind, it's necessary that "every effort be made to avoid the production of scrap."

Like Stainless — The machining of titanium has sometimes been compared to the machining of austenitic stainless steel. When a chip is turned from a bar of titanium, there is no built-up edge such as is characteristic of mild steel. Consequently, the surface finish is excellent.

Still, there are other problems — most of them stemming from the plastic properties and chemical characteristics of the metal. Titanium produces a high shear angle between work and chip during cutting. Thus a thin chip is moved at high speed over the tool face resulting in high cutting pressures. A great deal of heat is generated at the tool's cutting edge.

Chemically Active — At these relatively high temperatures, titanium is strongly reactive chemically. In contact with the hot cutting edge, it tends to gall, weld, and smear. All of which adds up to difficult cutting and drastically reduced tool life.

Since the generation of heat is the major problem, the solution obviously must be found in effectively lowering the temperature at the tool's cutting edge. This can be done by increasing feed, lowering cutting speed, and supplying a generous amount of cutting fluid.

Ground Rules—Battelle suggests a five-point program for machining titanium with an eye toward preventing scrap. First, titanium requires a "good cutting environment." Tools and machines must be strong, rigid, and of high quality. Parts must be carefully handled to avoid dents and scratches. Supervision and inspection must be diligent and plentiful. Stress relieving of machined parts should be practiced wherever advisable.

Lastly, all operation sheets should be clearly marked TITANIUM and should carry all essential machining information. Nothing should be left to guesswork. In addition to tooling details, speeds and feeds should be carefully spelled out. Cutting fluids should be specified, together with tool-replacement scheduling and wheel-dressing data.

Tips On Turning—The turning of titanium can be simplified considerably when certain rules are followed. Cutting tools must be kept sharp. They must be made of the right material and correctly designed for the particular turning operation. To minimize heat, the work should be flooded with rust-inhibitor-type coolants. In addition

to rigid equipment, live centers should be used to prevent seizures.

Here are some pointers on the choice of proper tool materials for turning operations. Use high-speed steel tools for interrupted cutting, form cutting and heavy plunge cuts. Use cast alloy tools for more severe plunge cuts, for cutting to dead center, and when the design calls for a long, narrow grooving tool. Carbides should be used for continuous cutting operations and removal of scale.

Tool Care—Those tool surfaces which are involved in metal cutting should be carefully lapped or honed by hand. Finish must be extra-smooth, and the direction of finishing should parallel chip flow direction. A slightly relieved cutting

TABLE I Tool Selection Chart

| MACHINING OPERATION | | | | | | | RECOMMENDED TOOL MATERIAL | | | | | |
|---------------------|-----|---------|-----------------|-------|-------|---------|---|----------|----------|---------------|--------|-----------------|
| Drill | Tap | Turning | | | | | AISI Code | Tungsten | Chromium | Vana- dium | Cobalt | Molyb- denum |
| | | Finish | Semi- finish | Rough | Scale | Milling | | | | | | |
| | ✓ | | | | | ✓ | T-1 | 18 | 4 | 1 | | |
| | | | | | | ✓ | T-2 | 18½ | 4 | 2 | | |
| ✓ | | | | | | | M-10 | | 4 | 2 | | 8 |
| ✓ | | | | | | ✓ | T-4 | 18 | 4 | 1 | 5 | |
| ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | T-5 | 18½ | 4 | 1¾ | 8 | |
| | | | | | | | T-6 | 20 | 4 | 2 | 12 | |
| | | | | | | | T-8 | 14 | 4 | 2 | 5 | |
| | | | | | | | T-15 | 14 | 4 | 5 | 5 | |
| | | ✓ | ✓ | ✓ | ✓ | | CAST ALLOYS | | | | | |
| | | | | | | | 44% cobalt, 3% iron, 17% tungsten, 33% chromium; and others | | | | | |
| | | ✓ | ✓ | ✓ | ✓ | | CARBIDES | | | | | |
| | | | | | | | Partial list of similar carbide types: | | | | | |
| ✓ | | | | ✓ | ✓ | (a) | C-1 | B 44A | CA3 | H K6 | C89 | 2A68 GS E8 |
| ✓ | | | ✓ | | | (b) | C-2 | A 883 | CA4 | HA K6 | C91 | 2A5 S-1 E6 |
| | | ✓ | | | | | C-3 | AA 905 | CA7 | HE K8 | C93 | 2A7 GA E5 |
| | | ✓ | | | | | C-4 | AA 999 | CA8 | HF K8 | C93 | 2A7 GF E3 |

(a) Rough milling.

(b) Finish milling.

edge will greatly extend the life of carbide cutting tools.

Tool design is critical and should not be underestimated. Back rake for carbides should range from $+5^\circ$ to -5° ; for cast alloys and high-speed steel, 0° to $+5^\circ$. Recommended end relief for carbides ranges from $+5^\circ$ to $+10^\circ$; for cast alloys 5° ; for high-speed steel 5° to 7° . The same ranges also apply for side relief angles.

Hints On Angles — The end-cutting-edge angle range for carbides is $+6^\circ$ to $+10^\circ$. For both cast alloys and high-speed steel, it is 5° to 6° . Nose radius per inch range is 0.03 to 0.045 for carbides and 0.02 to 0.03 for cast alloys and high-speed steel. Both side rake and side-cutting-edge angle must be predicated on the speeds, feeds, and other operating conditions that are to be employed.

In drilling titanium, drills must be kept sharp. A sharp drill produces a tight curling chip and generates least heat. When chip form takes on a feathered appearance, it is a sure sign that the drill needs resharpening. Don't wait until the drill becomes completely dulled. A dulled drill will very likely produce scrap.

Wet Drilling — Even a sharp drill of proper design will work more effectively with the help of a cutting fluid. Low speeds and heavy feeds will promote accuracy and reduce tool wear. Accuracy in drilling is especially important when a subsequent topping operation is involved.

Three types of tool material are recommended for drills intended for use on titanium. Cobalt high-speed steels are acceptable for general use and should be used for drilling sheet and deep holes. For hand-drilling sheet, use molybdenum high-speed steels. The more expensive carbides are excellent for deep-hole drilling on long production runs.

Drill Types — Heavy duty stub-type, screw-machine drills work well on titanium. On large sizes, the

crankshaft, notch-type drills can be used. In general, large flutes are preferred because they reduce the tendency to clog or jam. Drill length should be no longer than required by hole depth. Long, flexible drills tend to produce out-of-round holes.

Always drill titanium alloys at lower speeds than those used on commercially pure titanium. A triangular punch should be used for center-punching in order to avoid work hardening the surface. Whenever the alloy being drilled has a hardness of more than Rc 37, make sure to appreciably reduce drill speeds.

Always maintain a positive feed, making sure that the drill is definitely cutting and not just riding in the hole. If the drill is simply rubbing the metal, galling and welding of chips to the cutting edges is likely to occur. In drilling holes that are deeper than the diameter of the drill, make sure to retract the drill often enough to clear the flutes and avoid jamming.

Better Taps — One material, high-speed steel T-1, is recommended for taps. Although conventional, straight-fluted taps can be used, they tend to load up with chips. Chip driving-spiral point taps with interrupted threads and full eccentric relief usually work better. Whatever type tap is used must be precision ground and stress relieved.

To reduce rubbing action in tapping, interrupted threads with alternate teeth missing will help. Also, it is wise to grind away the trailing edge of the tap and grind axial grooves in the thread crests along the full length of the lands. Con-eccentric thread relief is recommended. In the opinion of some experts, nitriding greatly enhances the abrasion resistance of taps.

Use Paste or Oil — Using the proper lubricant for tapping is important. When a paste lubricant can be used, lithopone paste (30 pct SAE 20 oil and 70 pct Lithopone) is said to do a fine job. If

it is difficult to apply a paste lubricant, use a sulpho-chlorinated oil. Some grades are fortified with molybdenum desulphide.

Not too long ago, the grinding of titanium was considered one of the toughest of all machining operations. It isn't easy. Titanium should be ground at about the same rate ordinarily used for high-speed and die steels. Frequent wheel dressing is usually necessary. Care should be taken to avoid excessive loading of the grinding wheel. The tendency toward wheel loading is intensified when the wheel is dull.

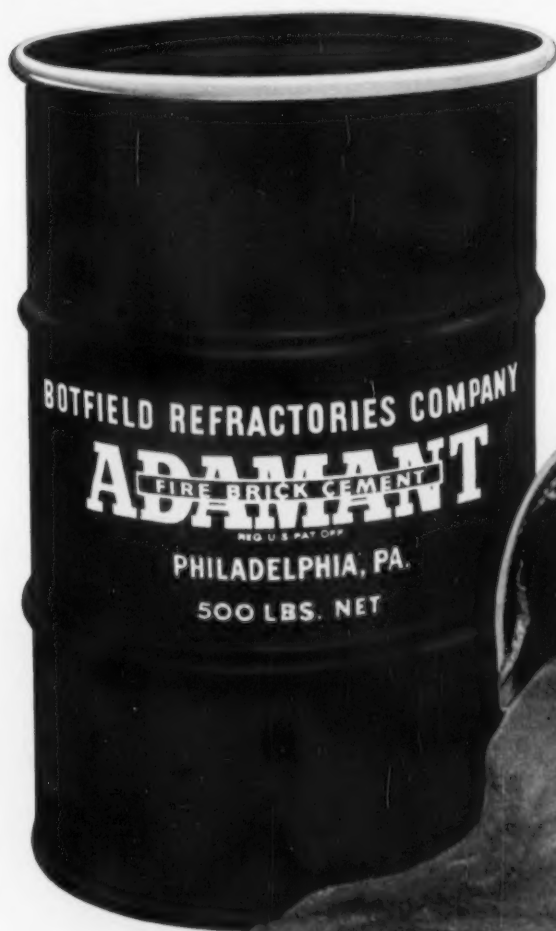
Proper Grinding — Improper grinding will often cause titanium to crack. This is the result of excessive temperatures and stresses. To avoid cracking, run the grinding wheel at low speeds and feeds and use plenty of grinding fluid of the inhibitor or purging types. It is sometimes necessary to stress relieve parts after grinding.

Two wheel materials are suggested for grinding titanium; silicon carbide and aluminum oxide. With a minimum of wheel wear, silicon carbide will produce the best surface finish. An aluminum oxide wheel produces the lowest residual stresses with minimum wheel wear.

ACKNOWLEDGMENT: The editors want to thank the many machining experts and metallurgists whose ideas and practical suggestions helped make this feature possible. Also, they want to acknowledge the generous assistance of Aluminum Co. of America, Battelle Memorial Institute, Copper & Brass Research Assn., Kaiser Aluminum & Chemical Corp., The American Brass Co., The Cincinnati Milling Machine Co. and The Dow Chemical Co.

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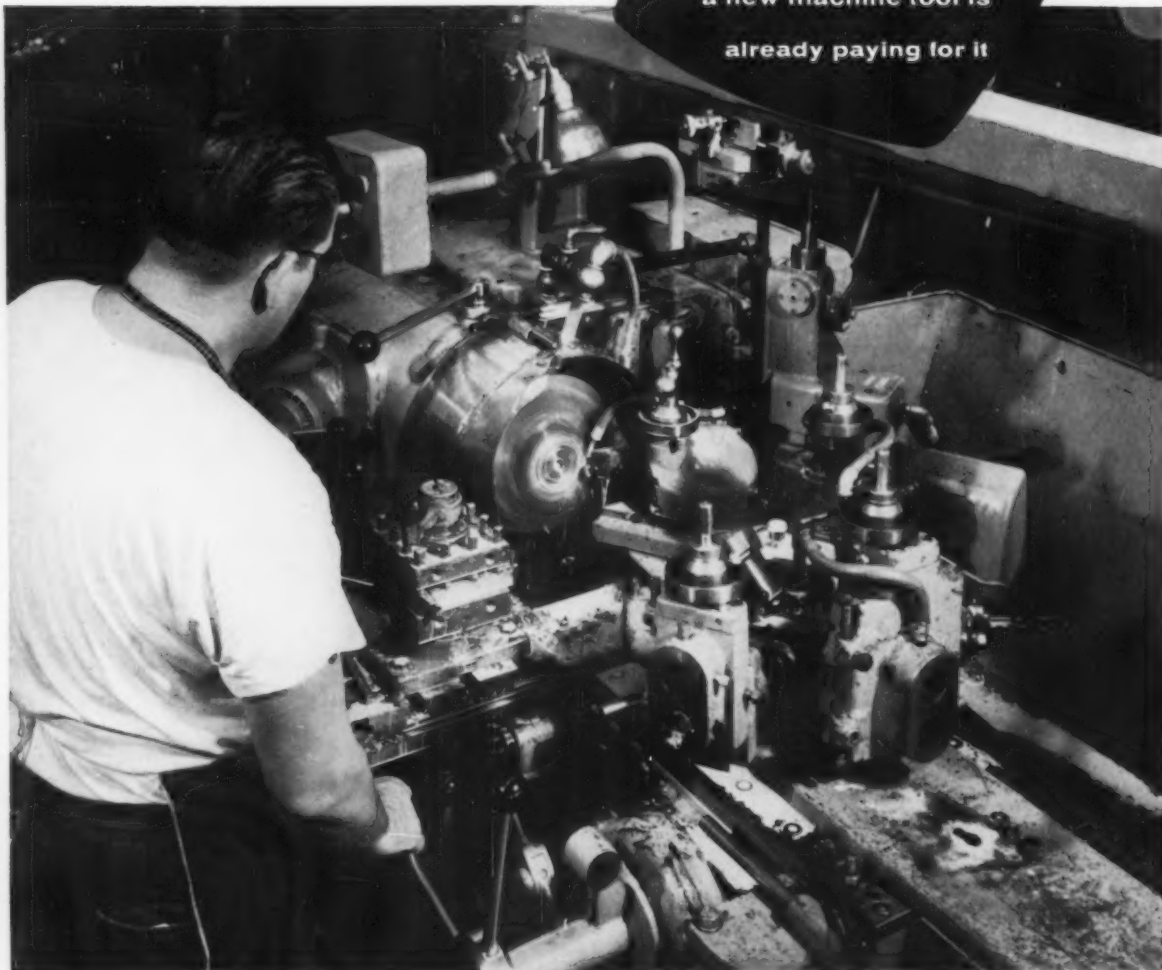
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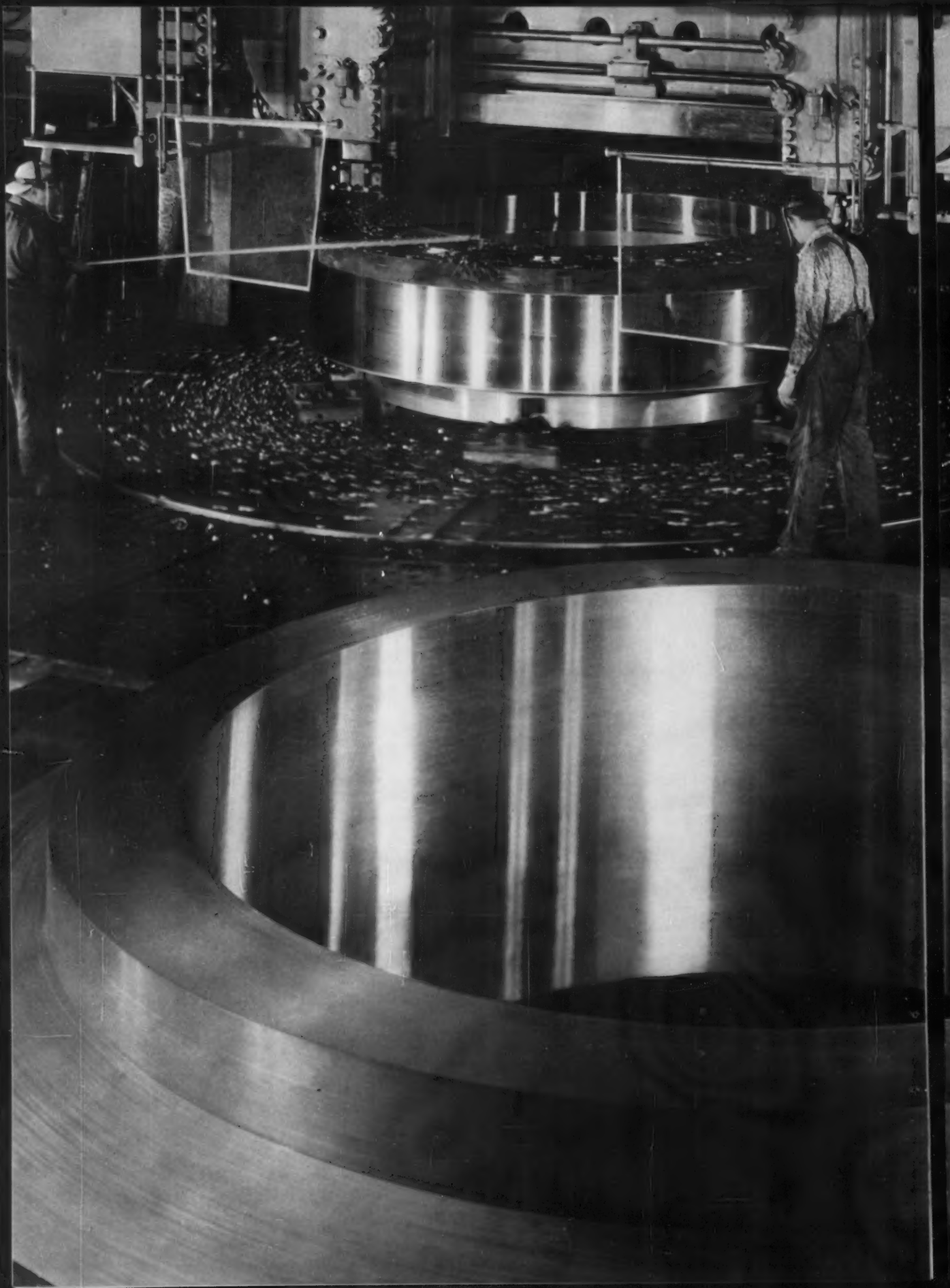
stressed members. Also used: 5370 tons of USS TRI-TEN Steel, a weldable high-strength low-alloy steel, and 6440 tons of structural carbon steel. Each of these steels—all available from United States Steel—plays an important role in the bridge, helping to make possible the "most bridge for the money."


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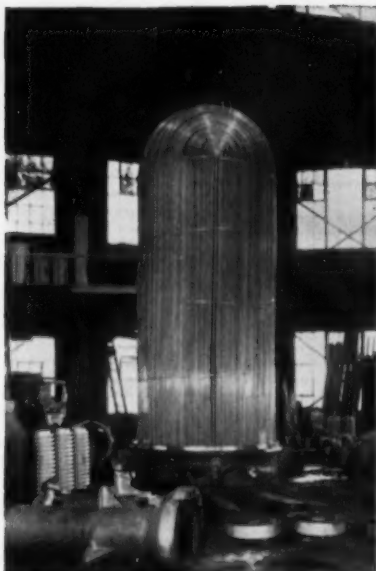
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▲ GRINDING DOWN ONE OF THE WELDS made in the vapor condenser shell of Revere Herculoy. Completed unit measured 90" x 26' with a total weight of 100,000 lbs. Units were fabricated by ADSCO DIVISION, YUBA CONSOLIDATED INDUSTRIES, INC., Buffalo, N. Y.

◀ TUBE BUNDLE of 2,150 Revere Copper Tubes, each 3/4" in diameter, rolled into 4,300 Tube Sheet holes, with a total weight of 26 tons and producing a surface of 14,000 sq. ft. To prevent damage during shipment wax was poured around the unsupported rounded ends of the tube bundle, which, when hardened, held the ends firmly in place. After the exchanger was placed into position the wax was blown out with steam.

exchangers contain REVERE METALS

105,000 lbs. of Revere Copper Tube and 50,000 lbs. of Revere Herculoy Plates are used in two 50-ton units fabricated for National Aniline Division, Allied Chemical & Dye Corp., by AdSCO Division, Yuba Consolidated Industries, Inc.

These two units are duplicates of the two constructed for National Aniline Division, Allied Chemical & Dye Corp. in 1953.

In addition to their huge size and weight it is interesting to note that the tube bundle was constructed of copper tube because of its high thermal conductivity and corrosive-resisting characteristics, and the shell made of Herculoy because of the accuracy and speed with which it can be welded, its great strength and corrosion-resistant features.

Herculoy is Revere's silicon bronze with the tensile strength of mild steel and

corrosion-resistant qualities of copper, and is a natural for shells such as these. Its characteristics also make it the economical answer for tube sheets and plates.

It is jobs such as this that have given Revere the background of experience that can prove valuable in the solution of your particular metals problem. And is still another example of Revere's Technical Advisory Service helping to select the right metal, in the right form, to do the best possible job with the greatest economy . . . whether it be copper, brass, aluminum, or any one of their alloys.

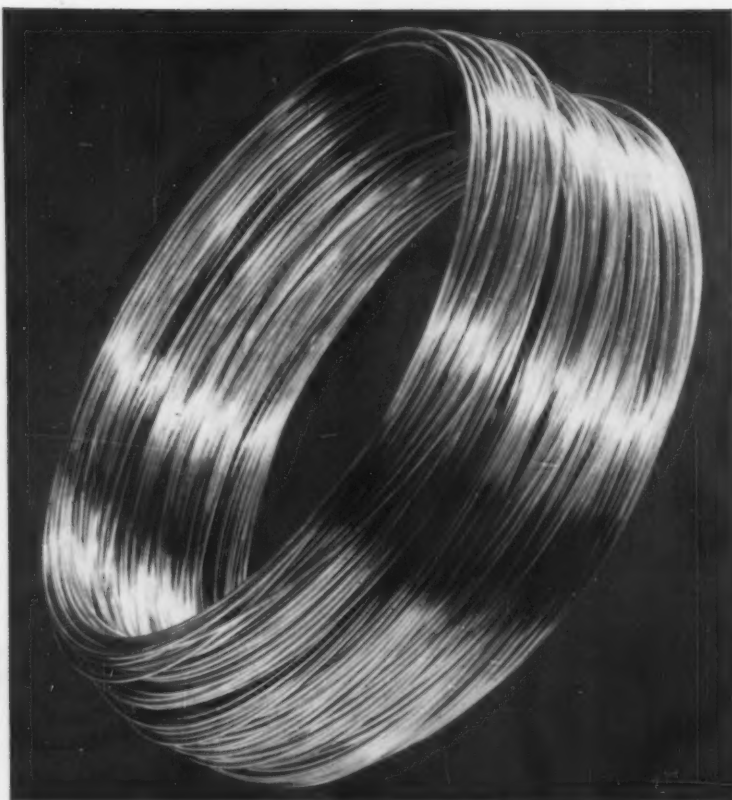
REVERE COPPER AND BRASS INCORPORATED

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Mills: Rome, N. Y.; Baltimore, Md.; Chicago, Clinton and Joliet, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Brooklyn, N. Y.; Newport, Ark.; Ft. Calhoun, Neb. Sales Offices in Principal Cities, Distributors Everywhere.





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Here's smoothness and luster you rarely get in tinned wire. Continental's special technique makes possible an enduring, uniformly bright finish . . . a wire so bright that it can replace plated wire on many products. It retains its brightness for long periods of time in normal use. Continental tinned wire meets your needs for quality and workability and is available in almost any temper and analysis in medium low carbon and low carbon steels.

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PRODUCERS OF: Manufacturer's Wire in many sizes, tempers, and finishes, including Galvanized, KOKOTE, Flame Sealed, Coppered, Tinned, Annealed, Liquor-Finished, Bright and special shaped wire. Also Welded Wire Reinforcing and Galvanized Fabric, Nails, Continental Chain Link Fence, and other products.

FREE LITERATURE

rear of truck and capacity is doubled. (Lewis-Shepard Products, Inc.)

For free copy circle No. 9 on postcard, p. 139

Cobalt for Alloys

A review of needs of cobalt in industry and of research in use of cobalt in high-temperature alloys is given in a 12-page report. (Cobalt Information Center)

For free copy circle No. 10 on postcard, p. 139

Numerical Drilling

How one drill press can do the work of five through numerical drilling control is the subject of a new brochure. (Electronic Control Systems Div., Stromberg-Carlson Co.)

For free copy circle No. 11 on postcard, p. 139

Springs

A booklet on springs describes a company's engineering, research, production, inspection and quality control facilities. (Hunter Spring Co.)

For free copy circle No. 12 on postcard, p. 139

Bond Tubing on Sheet

The process allows a designer to create any pattern within a single sheet of metal. A booklet describes the procedure step by step. (Olin Mathieson Chemical Corp.)

For free copy circle No. 13 on postcard, p. 139

Coolant Cleaning

Three new bulletins describe equipment for the continuous cleaning of coolant and cutting oils. (Inflico Inc.)

For free copy circle No. 14 on postcard, p. 139

Speed Measuring

A line of tachometer instruments and generators for speed measurements is the subject of an eight-page booklet. Emphasis is given to custom-marked scales, dual scales,

and color bands for machine tools and other process machines. (General Electric Co.)

For free copy circle No. 15 on postcard, p. 139

Gears and Shafts

A folder covers all types of gears and shafts for dependable transmission of power. (The Adams Co.)

For free copy circle No. 16 on postcard, p. 139

Precision Boring

How to solve production problems in precision boring is the subject of a new folder. (Jones & Lamson Machine Co.)

For free copy circle No. 17 on postcard, p. 139

Indexing Machine

A new series of universal, automatic rotary indexing machines are available with table diameters up to 84 in. (The Lapoint Machine Tool Co.)

For free copy circle No. 18 on postcard, p. 139

Carbide Tools

A piloted step core drill is one of many special carbide tools included in a catalog. (Chicogo-Latrobe)

For free copy circle No. 19 on postcard, p. 139

Film Lubricants

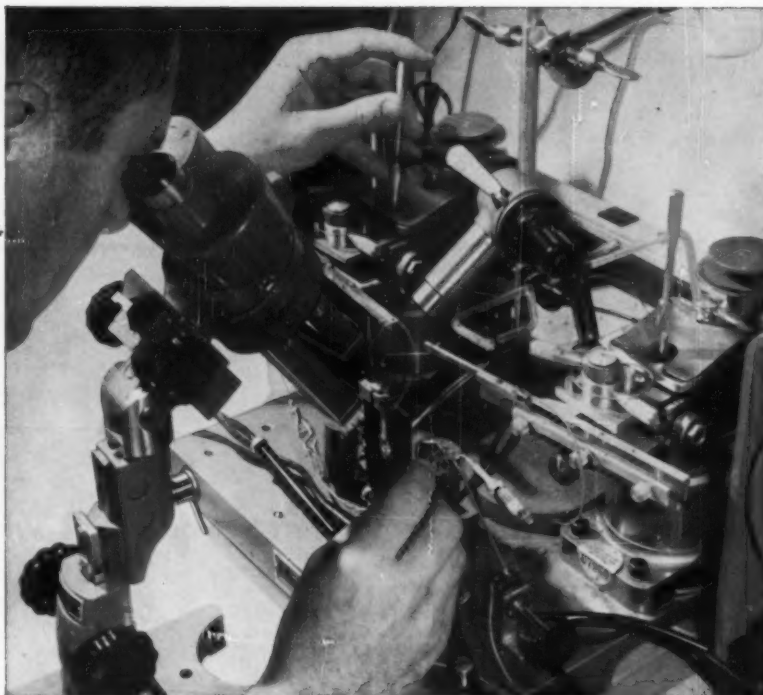
Eight solid film lubricants solve difficult lubrication problems. A new catalog tells how the family of films withstand rugged conditions: High temperature (1500°F), low temperature (-300°F), corrosion resistance, high loads (225,000 psi), and high speeds (30,000 rpm). (Electrofilm, Inc.)

For free copy circle No. 20 on postcard, p. 139

Electrical Controls

Over 100 pages of technical information cover cabinet sizes, knockout arrangements for safety switches, circuit breakers, raintight switches, panelboards and wiring troughs. (The Wadsworth Electric Mfg. Co.)

For free copy circle No. 44 on postcard, p. 139



3-D MICRO-VISION

helps RAYTHEON develop new SPACISTOR amplifier



Spacistor shown next to ordinary pinhead.

The Spacistor, Raytheon's new semiconductor amplifier, opens new horizons in missile and communications equipment design. Still in development, the Spacistor promises to combine many advantages of transistors and vacuum tubes.

Viewed through a Bausch & Lomb Stereomicroscope, contact points that are normally barely visible can be positioned with hairline accuracy. 3-D magnification shows all parts vividly, right side up. Long working distance permits free movement

of hands and tools between eyepiece and stage. Dustproof, shockproof optical system, with sharp, flat images free from distortion, assures fatigue-free viewing throughout prolonged examination.

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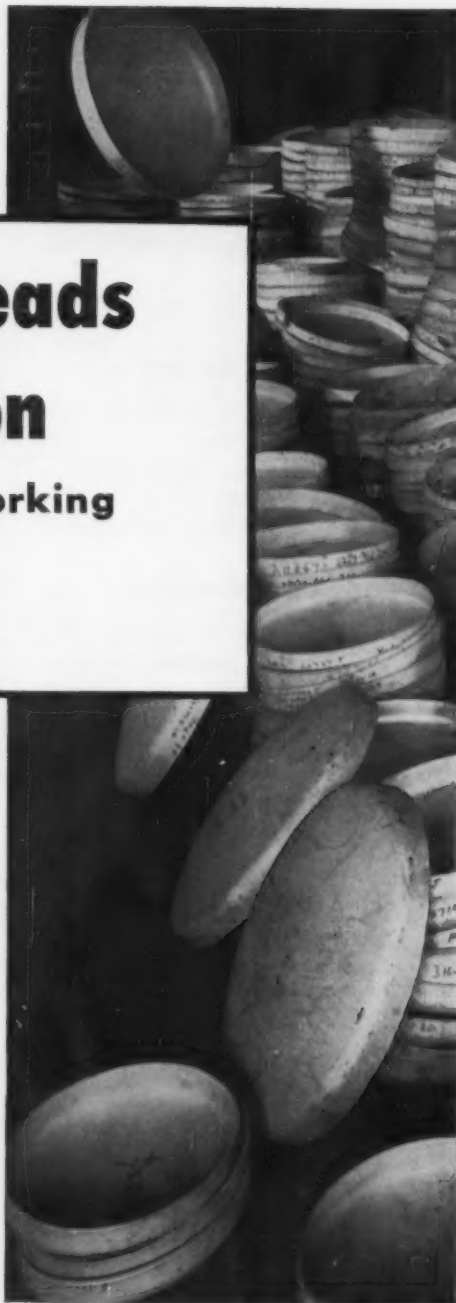
Stainless Steel Heads stocked by Carlson

- ▶ keep your working capital working
- ▶ save you money
- ▶ give you prompt delivery

It pays to design and build equipment with this stock in mind. You don't have to tie up your working capital in shell plates, pipe and fittings while you wait eight or ten weeks for tank heads. You'll save money by using the less expensive stock sizes that are pressed, rather than odd sizes that must be spun. You also save time when you need stainless steel heads for new construction or for emergency replacement.

The Carlson stock is made up of ASME and Standard flanged and dished stainless steel heads. They range from 10" O.D. through 72" O.D., in 6" increments, $\frac{3}{16}$ " through $\frac{3}{8}$ " Gauge, in Types 304, 304-L, 316, and 316-L. All are fully annealed and pickled after forming to provide maximum corrosion resistance. Flanges can be machined to your specifications in a matter of days.

In addition to maintaining the country's largest stock of stainless steel heads, dies are available for pressing heads in other grades of stainless. Special sizes can be spun when required. To get all the facts on this unusual Carlson service, mail the coupon and we'll send you the latest Heads File-Folder and Stock List.



G.O. CARLSON Inc.

Stainless Steels Exclusively

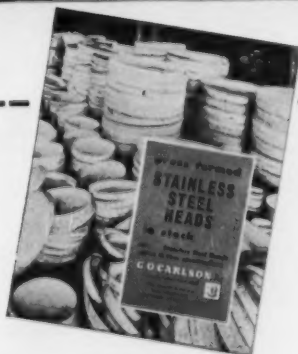
THORNDALE • PENNSYLVANIA

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This Carlson Stainless Steel Heads File-Folder includes lists of Dies for press forming and information on flange machining.

PLATES • PLATE PRODUCTS • HEADS • RINGS • CIRCLES • FLANGES • FORGINGS • BARS and SHEETS (No. 1 Finish)



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 File-Folder and Stock Lists.

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City: _____ State: _____

Trimming steel plates with hydraulic shears cuts cost at Caterpillar Tractor Co.



8 ft. shear representing investment of less than \$1 per hour pays for itself out of savings in 36 months. The 8 ft. Pacific shear at Caterpillar Tractor Co. shown here, the largest hydraulic in the world, cuts material up to 1½" thick from flat bar stock and plates to finished

lengths and widths and trims angles. All heavy shearing at Caterpillar Decatur, Ill. plant is done on Pacific Hydraulic Shears.

Any plant, large or small, can reduce cost of shearing metals of sizes from 20 gauge to 2" plate with a Pacific shear of the corresponding size or with an adjustable rake Pacific shear.

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**PACIFIC INDUSTRIAL
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PACIFIC

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FREE LITERATURE

Continued

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Vacuum Plate Handler

The economics of manual versus one-man mechanical plate handling are discussed in a new folder. Push-button unit can be used with floor or cab-operated cranes. (Noble Co.)

For free copy circle No. 21 on postcard

Welding Design

Devoted to tentative design standards for resistance formed welds in mild steel, a 50-page technical report uses line drawings to illustrate various welded joints. (Sciaky Bros., Inc.)

For free copy circle No. 22 on postcard

Clutch-Brake

With a torque range of 100 oz.-in. for the clutch and 8 oz.-in. for the brake, a new miniature clutch-brake combination serves in computers and aircraft equipment. Bulletin gives technical data. (Stearns Electric Corp.)

For free copy circle No. 23 on postcard

Cold-Finished Bars

A 30-page booklet offers tips and technical data on selection of cold-finished bar products. It includes information on carbon corrections and furnace treatment. (Union Drawn Div., Republic Steel Corp.)

For free copy circle No. 24 on postcard

Insulating Block

High-temperature spun mineral wool insulating materials are described in a new booklet. The fibers

will withstand temperatures to 1700°F. Details of actual industrial applications are covered. (Baldwin-Hill Co.)

For free copy circle No. 25 on postcard

Throw-away Inserts

A bulletin describes micro-adjustable tooling using throw-away inserts. It contains specifications and costs of several tooling ideas suitable for turret lathes. (Wesson Co.)

For free copy circle No. 26 on postcard

Lube Windows

Completely oil-tight, new, easy to install window units are presented in a 4-page folder. These self-contained windows set into equipment, giving a transparent picture of lubricant (and other oil) levels. (Bijur Lubricating Corp.)

For free copy circle No. 27 on postcard

All-ac Drive

Data sheets describe an all new, all alternating-current adjustable speed drive. System includes: ac motor, operator control, control cabinet. (Electric Products Co.)

For free copy circle No. 28 on postcard

Tooling Plate

Cast aluminum tooling plate described in a 12-page booklet is produced by a firm which specializes in making this one product—and making it as perfect as possible. Of a special alloy, this plate is lightweight and highly stable, easily welded or machined. (Red Seal Metals Co.)

For free copy circle No. 29 on postcard

Radial Drill

Power indexing, a turret type radial drill is described in a 6-page folder. This six-spindle, automatic clamping unit eliminates quick-changing of tools in chucks. (Burg Tool Mfg. Co., Inc.)

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Lift Maintenance

To cut materials handlers' downtime, an electric fork-truck chart

Postcard valid 8 weeks only. After that use own letterhead fully describing item wanted. 4/24/58

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FREE LITERATURE

offers tips on how to keep your truck working right. It provides a maintenance check-list. (Lewis-Shepard Products, Inc.)

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Limit Switches

A data sheet describes a new series of hermetically sealed limit switches. These work at -65 or $+600^{\circ}\text{F}$. (Micro Switch Div., Minneapolis-Honeywell Regulator Co.)

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Milling Machines

Increased cutter range and versatility is claimed for a line of milling machines described in a folder. (Cincinnati Milling Machining Co.)

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Flash-Butt Welders

Forty butt-welders designed for specific applications are covered in a 16-page bulletin. (Taylor-Winfield Corp.)

For free copy circle No. 34 on postcard

Gear, Clutch Units

A new assembly-component catalog supplement lists over 500 packaged parts, such as speed reducers, helical gears, magnetic clutches, and instrument panel clocks. (PIC Design Corp.)

For free copy circle No. 35 on postcard

3-Way Machining Unit

A horizontal milling, drilling and boring machine is illustrated in a folder. Stepless feed is provided for all motions of the head, table saddle and spindle. (The Portage Machine Co.)

For free copy circle No. 36 on postcard

Overhead Conveyors

A line of overhead-trolley conveying systems is the subject of a new eight-page catalog. Included are blueprints and specifications of

wheels, trolleys, chain, take-ups, drive units, roller turns, traction wheels, and trolley attachments. (The Alvey-Ferguson Co.)

For free copy circle No. 37 on postcard

Ductile Iron Castings

Product designers will find data on foundry facilities available for producing quality ductile iron castings in a new 12-page bulletin. (The Cooper-Bessemer Corp.)

For free copy circle No. 38 on postcard

Select Wire Rope

Written for anyone who buys, sells, or uses wire rope, a new 16-page booklet describes the basic principles in selecting the proper rope construction for any job. (Leshen Wire Rope Div., H. K. Porter Co., Inc.)

For free copy circle No. 39 on postcard

Hard Surfacing

If you are presently using hard surfacing electrodes or automatic or semiautomatic welding wires, you will be interested in a new hard surfacing catalog. (The McKay Co.)

For free copy circle No. 40 on postcard

Hydraulic Systems

A practical introduction to the principles of hydraulic systems is covered in a revised 44-page book. It contains sections on oil selection and trouble-shooting. (Sun Oil Co.)

For free copy circle No. 41 on postcard

Screw Lead Error

Lead error is the number one cause of costly fastener fit problems. A 16-page booklet can show you how to cure this malady. (Standard Pressed Steel Co.)

For free copy circle No. 42 on postcard

Cold Roll Forming

An 88-page reference manual tells how to produce a wide variety of metal shapes by cold roll forming. (The Yoder Co.)

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JAI-ALAI
ACE
FAILS
TO FLAKE
INLAND

TI-CO

FABRICATION WON'T FLAKE TI-CO EITHER

A jai-alai ball travels at speeds over 100 m.p.h.—hits with terrific impact. From a distance of only 60 feet, one of Mexico's leading jai-alai players, Jose Fuerto, slammed the ball into a TI-CO Galvanized Sheet again and again—severely pounding it—but there wasn't a sign of flaking!

In your manufacturing operations, TI-CO can be deep drawn, stamped, bent, crimped, lock-seamed, even spin-drawn, without flaking or peeling. In fact, any product that can be made from cold rolled steel can be made from TI-CO, giving your product dependable protection against corrosion and an eye-appealing finish that can mean stepped-up saleability.

If you are designing or manufacturing a metal product that requires rugged strength plus corrosion resistance, you'll find TI-CO Galvanized Sheets the practical and economical solution. Coils or cut lengths up to 60" widths; gages 8 to 30 inclusive. Consult your local steel distributor or Inland representative. Write today for a free, informative booklet on TI-CO.



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TMI Tubing hits the "Space" trail with firm Confidence

Only experience gives the TMI organization the resolve to accept the ultimate in pioneering assignments in cold-drawn stainless steel and alloy tubing year after year. Tested by thousands of applications in remote excursions into the newest of

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power: TMI tubing is practically a synonym for "outer space" ability throughout the metalworking industry. That reputation keeps us on our toes mentally and physically ... constantly. Perhaps that's why your tubing application needs the TMI stamp of firm confidence. Try it and see for yourself.

Stainless Steel and Special Alloy Tubing .050" to .625" O.D. with Tolerances as close as .001" when the applications require it.

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TUBE METHODS INC.
METALLURGISTS • ENGINEERS • MANUFACTURERS
BRIDGEPORT (Montgomery County), PA.

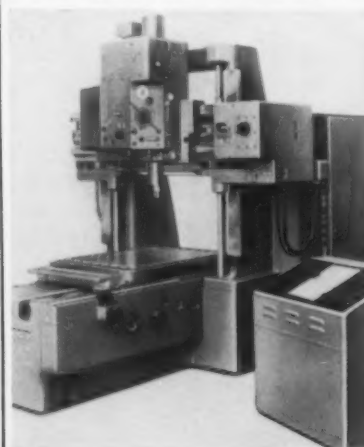
Tool Engineers Show: Exhibit Highlights

Watch for these displays as you walk through the aisles of the coming ASTE Tool Show.

It's only by checking the latest in tooling methods and equipment that you can plan to meet competition.

Jig Borer, Miller

Using a coordinate positioning device, this unit measures and machines large precision parts. A combination jig boring and milling machine,



it produces close-tolerance parts in quantity. It has scales with a guaranteed spacing of 0.00015 in. (American SIP Corp., Booth 1734)

For more data circle No. 45 on postcard, p. 139

Micro Projector

Vertical design gives this micro projector several convenient advantages. Flat work lays on the horizontal stage without holding devices. However, the stage can tilt when necessary. Projection lenses that slip into a vertical socket offer a choice of fixed magnifications

from 10 to 100 times. The enlarged image shows on an inclined screen in front of the observer. Standing



on its own floor base, this unit is self contained. (George Scherr Co. Inc., Booth 445)

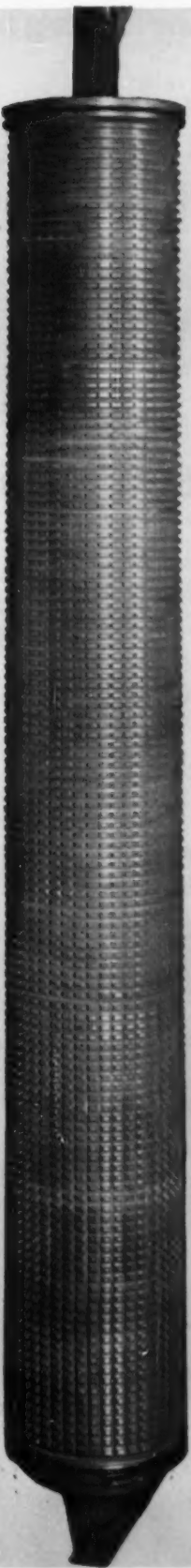
For more data circle No. 46 on postcard, p. 139

Saw Grinder

This blade grinding machine for circular saws with solid or inserted teeth grinds high and low teeth in one operation. Shifting a lever per-



mits handling straight or curved teeth. Chamfering can be done with a spindle adjustment. Separate motors drive the spindle and gear box, which gives eight indexing



Who Would You Trust to HEAT-TREAT a BROACH Like This?

At the time this Red Ring Naloy Broach* reached heat-treat, about \$5,000.00 had been spent on it. One mistake during the heat-treat operation could reduce it to scrap. In addition, the resulting delay might seriously disrupt our customer's production schedules.

These are only two of the reasons why Red Ring Broaches are heat-treated in our own plant under control of our own metallurgists. Here we have equipment especially designed and selected for just this type of work. Here we have an organization with a background of know-how that has been building up for the last 30 years.

Complete control over every production operation by men who KNOW broaches, gives the Red Ring Broach that extra precision—that extra service life—that added economy for the user.

**See the cover illustration of American Machinist, November 4 issue.*

7983



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ORIGINATORS OF ROTARY SHAVING

**NATIONAL BROACH
& MACHINE CO.**

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WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT

9 1/4" Dia.
69" Long
5/7 D. Pitch
44 Teeth

You're invited to see a major advance

X-RAY ORIENTATION USE IN

Presented by the

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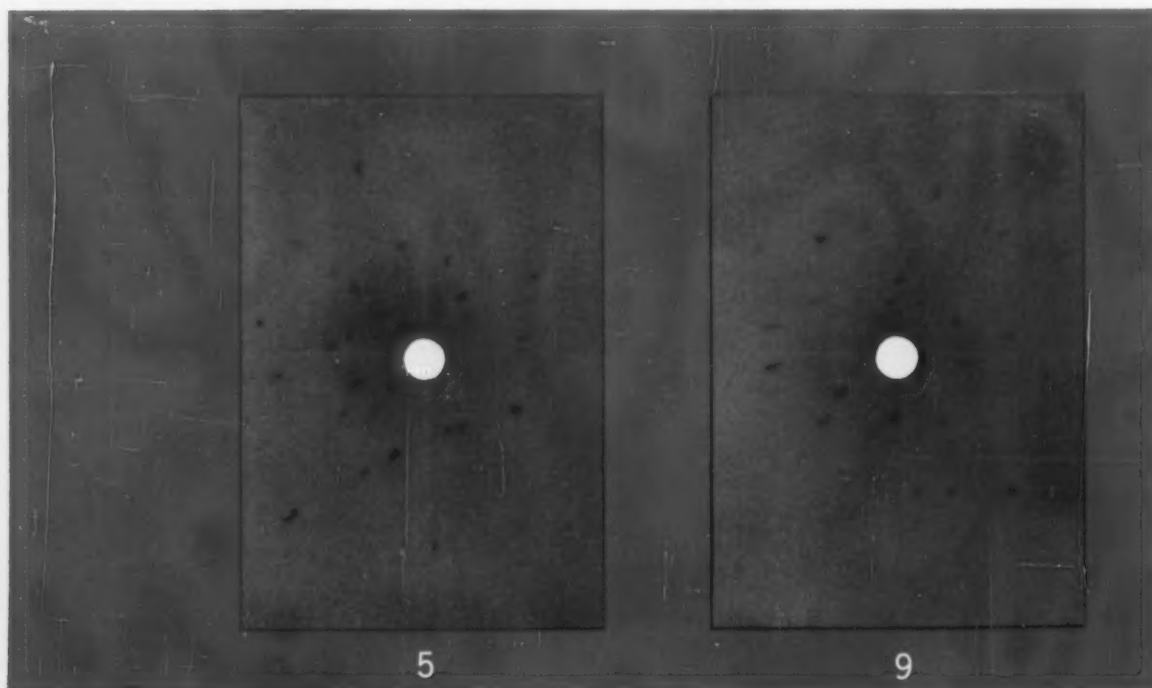
in collaboration with the Diamond Research Laboratory

at the TOOL SHOW

AMERICAN SOCIETY OF TOOL ENGINEERS

Booth 1850, Convention Hall, May 1 to 8, Philadelphia, Pa.

Papers on the orientation of diamonds and the performance of oriented diamond tools will be presented at the A. S. T. E. Symposium on May 5-6.

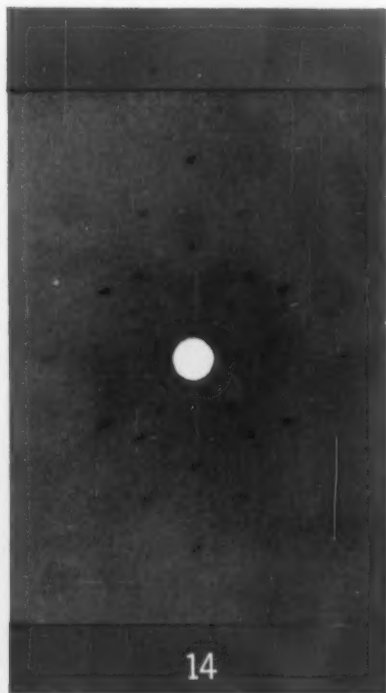


in diamond tool efficiency—the new

OF DIAMONDS FOR DIAMOND TOOLS

This new, major advance provides...

- 1 Standardization of diamond tools!
- 2 Substantially longer diamond life!
- 3 Optimum diamond tool use!
- 4 Predictably longer tool operation
in production runs!
- 5 Worth-while cost savings!



WHICH OF THESE DIAMOND TOOLS WILL OUTPERFORM THE OTHERS 3 to 1?

Here are X-ray diffraction patterns of Hoglund dressing tools. X-ray diagrams No. 9 and No. 5 are typical of the orientation of tools manufactured by conventional methods. No. 14 is an X-ray diagram of a tool precisely oriented by *X-ray diffraction*. It will *outperform conventional tools 3 to 1!*

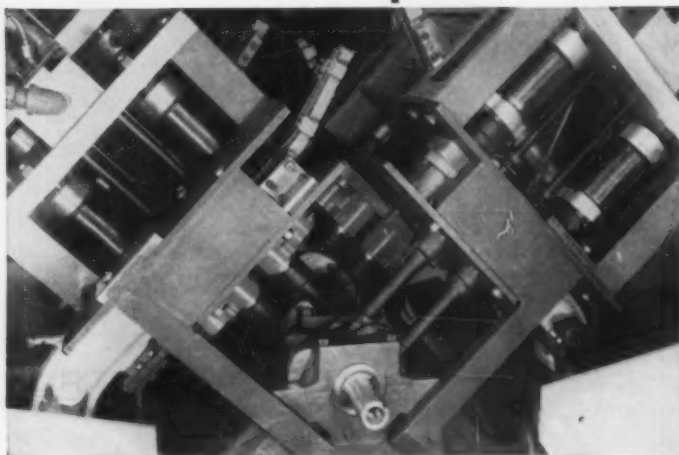
Through the use of X-ray orientation a whole series of Hoglund tools can be properly oriented easily by diamond tool manufacturers.

Hoglund tools are only one type of diamond tools in which X-ray orientation produces remarkable increases in performance. Plan now to see this detailed demonstration of X-ray oriented diamond tools . . . and so it won't slip your mind, clip this ad as a reminder.

DIAMOND RESEARCH LABORATORY Johannesburg,
South Africa

automatic assembly

machine feeds
and tightens nuts to prescribed torque
at the rate of
2240 nuts per hour



Here is the working head of the machine capable of feeding and tightening 2240 connecting rod nuts per hour!

The heart of this machine is the Ingersoll-Rand air-powered nut runner with fool-proof Ingersoll-Rand "run-to-stall" torque control.

Ingersoll-Rand has pioneered in the field of assembly machines for running nuts and screws. There is almost no limit to the bolt or screw pattern for which a machine can be developed. Savings in time and costs result in unusually fast pay-out.

If your assembly involves repetitive fastening with bolts, nuts, or screws, it will pay you to consult your Ingersoll-Rand AIRengineer. Chances are he can make recommendations that will materially cut your costs. Ingersoll-Rand, 11 Broadway, New York 4, N.Y.



Ingersoll-Rand

Tools plus AIRengineering
increase output per man

PREVIEWS

speeds. (Cawi Machine Co., Inc., Booth 972)

For more data circle No. 47 on postcard, p. 139

Swaging Machine

Heavy tubing, rods and other parts that cannot be swaged in the usual manner are handled on this

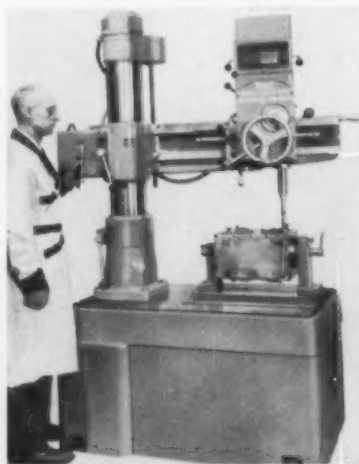


new machine. Featuring an electro-hydraulic die closing attachment, the rotating dies close around the work by hydraulically operated wedges. (The Torrington Co., Booth 1216)

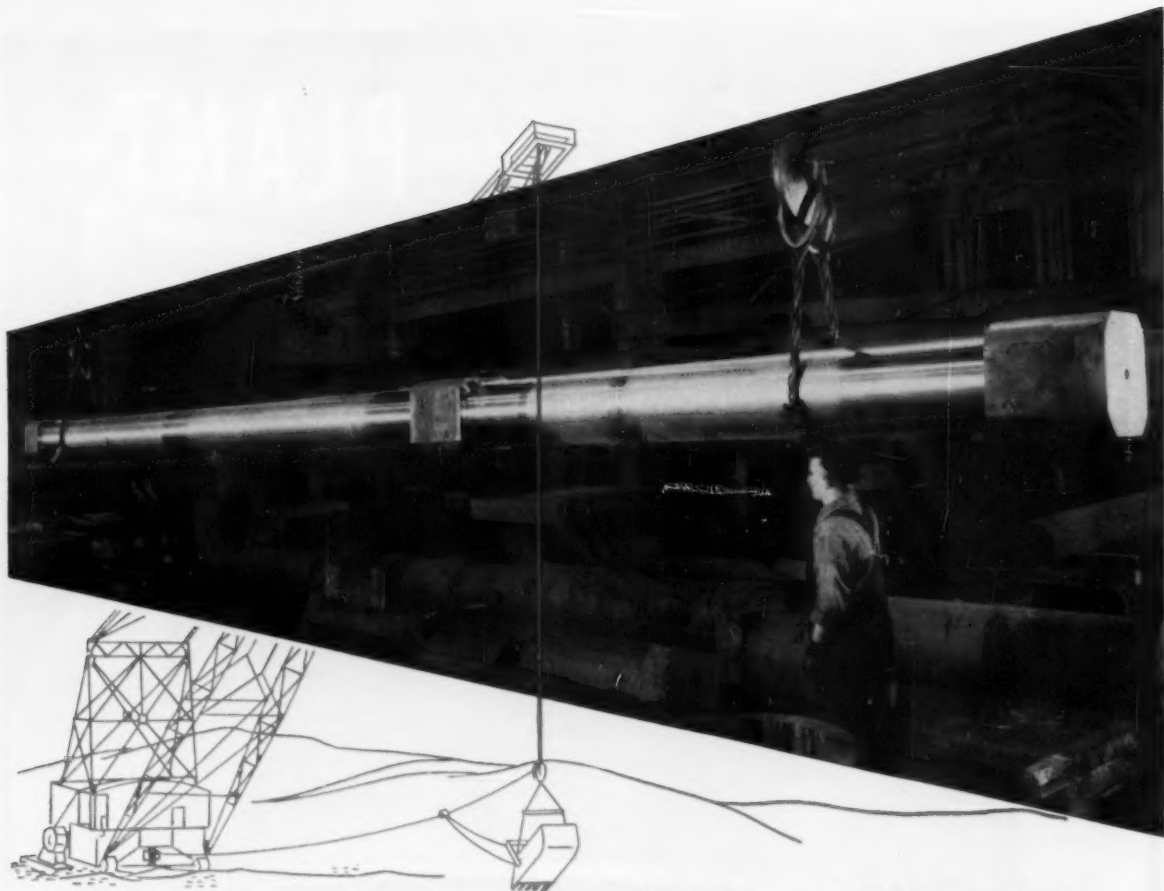
For more data circle No. 45 on postcard, p. 139

Radial Drill

Metalworking shops may be interested in a new 3-ft radial drill. Its hardened alloy column turns on



tapered roller bearings. Inserts on the head and arm ways are hardened. Drive gears give 16 spindle speeds while a drill ejector speeds



SAVE MONEY with FINKL FORGINGS
Manufacturers of earth moving equipment do!



Walking draglines are ingenious, mobile monsters employed for digging and moving earth. Because of their size and applications, often in isolated areas, they must be dependable and steady in their operations. Only the best materials and workmanship will prevent costly downtime in the field.

Many of these machines employ Finkl forgings. The 48 foot "walker" shaft shown above transfers power from the engine to the walking mechanism of the dragline to move as much as 450 tons of equipment. Here the best materials and craftsmanship will prove the least expensive in the long run.

For over 78 years, Finkl has produced the best in cylinders, spindles, driveshafts, and special forgings both rough turned and finish machined. When you are considering forgings or die blocks, call your local Finkl representative.

A. Finkl & Sons Co.
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Offices in: DETROIT • CLEVELAND • PITTSBURGH • INDIANAPOLIS • HOUSTON • ALLENTOWN • ST. PAUL
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PICTURE OF A PLANT—



Equipped for ANY Pipe Threading Operation!

An installation of eight LANDIS Pipe Threading Machines is shown at Jarcho Brothers' plant in Long Island City. These machines, ranging from 2" to 12" in size, thread, ream, bevel, and cut off pipe varying from 1/2" to 12" in diameter.

LANDIS Pipe Machines are built for heavy-duty service in continuous production. Quality threads and close concentricity is guaranteed by the slight floating action of the die head in the T-slot of the crossrail, and by the adjustable grip feature which assures correct alignment of the work in the chucks.

Tool inventories are relatively small since the LANDIS Chasers used will thread all diameters within the range of the die head having the same form, pitch, and taper. These chasers also reduce tool replacement cost for they can be reground and used for most of their length, and can be replaced individually as needed.



LANDIS *Machine* COMPANY •

WAYNESBORO
PENNSYLVANIA

THE WORLD'S LARGEST EXCLUSIVE MANUFACTURERS OF THREAD GENERATING EQUIPMENT

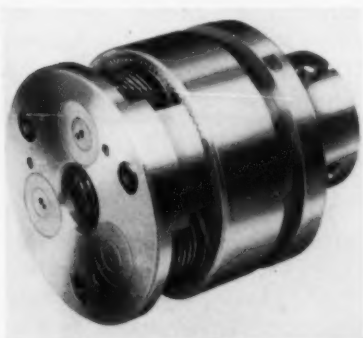
PREVIEWS

tool changes. Push buttons control arm raising and lowering. Table height is 26 in.; up to 36-in. jobs can be accommodated under the spindle. To reduce downtime in case of breakage, the head, transmission, drive unit and elevation gear box easily remove for service. (Veet Industries, Booth 1262)

For more data circle No. 49 on postcard, p. 139

Thread Rolling Heads

New stationary and revolving thread rolling heads permit high speed production. The rolls do not require regrinding, and can be operated without adjustment after



establishment of initial size. They feature replaceable helix angle bushings. One set of standard bushings functions to roll both U.N.F. and U.N.C. threads through a "mean" angle suitable for all diameters and pitches within the range of the head. (Landis Machine Co., Booth 1538)

For more data circle No. 50 on postcard, p. 139

Bore Gage

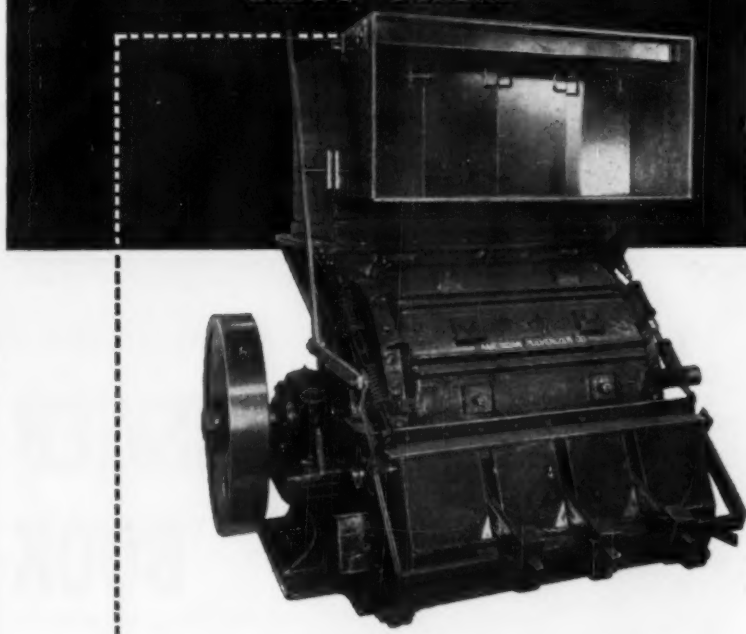
One of the world's smallest, a new dial indicating bore gage, checks bores down to 0.032 in. Interchangeable gaging heads give it a range up to 0.064 in. (Boice Gages, Inc., Booth 234)

For more data circle No. 51 on postcard, p. 139

Measuring Scale

Operators can read to an accuracy of 0.0001 in. or better and obtain repeat settings to thirty millionths with a new measuring scale. Designed for use on milling ma-

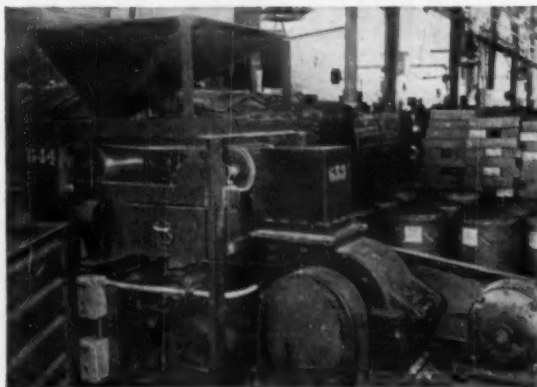
convert metal turnings into cash



Long, curly, troublesome metal turnings, reduced in an American Metal Turnings Crusher, can produce additional profits for your plant.

Reduced to chip form, metal turnings bring \$2 to \$5 more per ton. Handling metal chips by shovel or pneumatic systems is easier, too, and chips require 75% less storage space than bulky machine turnings. You'll recover more cutting oil from chips . . . up to 50 gallons per ton! More important, American Metal Turnings Crushers pay for themselves and produce substantial profits for years to come. Models available with capacities ranging from 1 to 50 tons per hour. To get all the details, write American today.

reclaim fused welding flux



One industrial plant saved more than \$10,000 a year by using an American Welding Flux Crusher to regranulate fused welding flux. Write American for details.

American  **PULVERIZER COMPANY**
ORIGINATORS AND MANUFACTURERS OF RING CRUSHERS AND PULVERIZERS
1439 MACKLIND AVE. SAINT LOUIS 10, MISSOURI

PREVIEWS

chines, jig borers or grinders, the scale has graduations in intervals of 0.001 in. A vernier in the eyepiece of the viewing microscope permits direct readings to 0.00001 in. This also offers a method of measuring independent of the machine's screw mechanism which may, in due

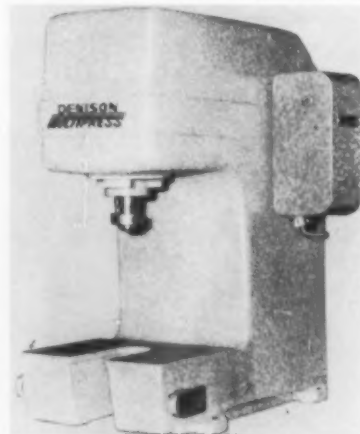
time wear. (Micro-Line, Inc., Booth 138)

For more data circle No. 52 on postcard, p. 139

Hydraulic Press

Combining volume production and versatile tooling features, these presses can be used in automated production systems. The machines perform assembling, riveting, trimming, straightening, and other op-

erations. Two models are offered. The 1-ton unit varies its ram pressure from 500 to 2000 lb; the 2-ton unit can be set from 500 to 4000



lb. A dual safety control system permits operation only when both hands are on the actuating buttons. (Denison Engineering Div., Booth 1012)

For more data circle No. 53 on postcard, p. 139

Hard Surfacing

Hexagonal plates of cemented carbide, mounted on a flexible adhesive backing, can hard face flat or curved surfaces. The backing



simplifies application since the sheets can be cut to size or shaped to cover irregular surfaces. Two sizes in several thicknesses are available. (Kennametal, Inc., Booth 1605)

For more data circle No. 54 on postcard, p. 139

Air Tools

Small wheel hand grinders are available in three types: short, long and small end. The same basic air motors are in each. Features include: one piece spindle, twin heavy



ANSWER BOOK FOR YOUR

TOOLING PROBLEMS

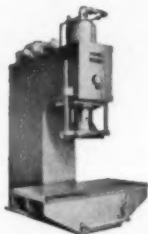
Do rising tooling costs—and the demands for increasingly tighter tolerances—have you cornered? Send for Red Seal's new fact book on "775" Cast Aluminum Tooling Plate... find out the 7 ways this modern material can help get your tooling costs **down**, your product quality **up**.

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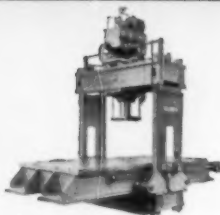
Upper New England: Atlantic Aluminum Distr.; Springfield, Mass.
New York, Lower New England: Peter A. Frasse Co.; New York City
South & Southeast: Atlantic Steel Co.; Atlanta, Ga.
Midwest: U. S. Steel Supply; Chicago, Cleveland and St. Louis
Rocky Mountain Area: M. L. Foss, Inc.; Denver
Pacific Coast: U. S. Steel Supply; Los Angeles & San Francisco



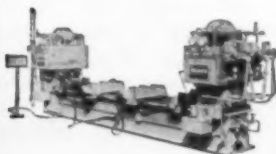
C-FRAME PRESS — for general purpose straightening, bending, forcing, forming. Fast, flexible.

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HOBBIING PRESS — a powerful tool for sinking hardened hubs into blanks of cold steel.



BULLDOZER — for heavy bending and forming. Optional choice of bed size, stroke, and speed.

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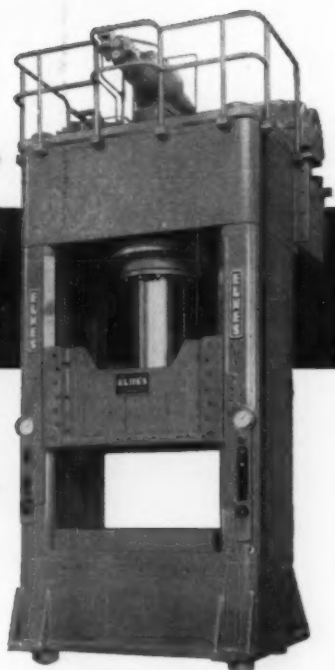
Whether you're seeking improved and more economical press performance for your present metalworking production, or there's a development planning job to be done, you can count on Elmes to provide *the right press for the job*. Elmes builds a complete line of standard hydraulic presses for a broad range of metalworking operations — for drawing and forming, coining, forging, hobbing, bending, straightening, forcing, powder metal compacting, etc.

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Elmes American Steel Foundries ENGINEERING DIVISION

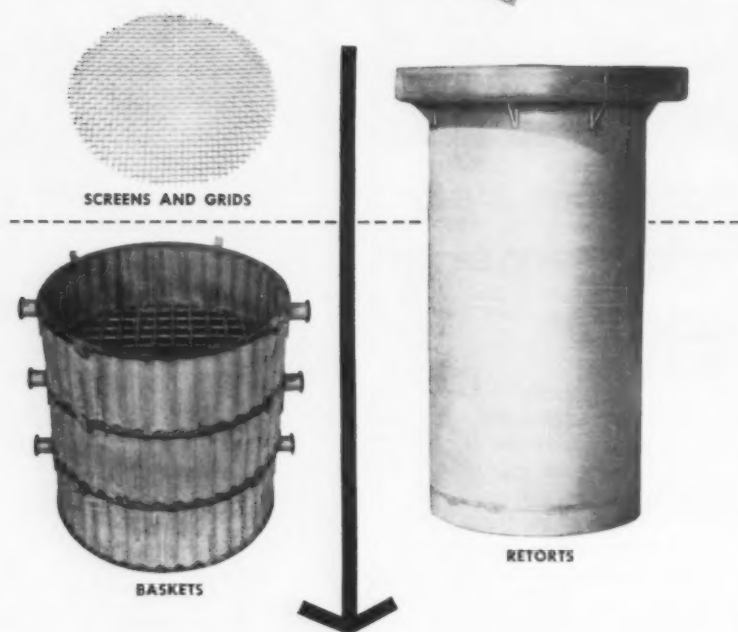
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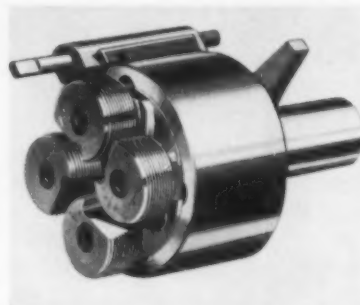
PREVIEWS

duty ball bearings at the wheel end and a centrifugal governor for all speeds. Various spindles and attachments give 45 different setups. (Rotor Tool Co., Booth 1832)

For more data circle No. 55 on postcard, p. 139

Automatic Die Heads

Automatic die heads in one maker's line permit use of the same head with chasers for threading or



cutters for hollow milling. They take circular and adjustable blade ground thread chasers or cutters for end forming. Rolls can also perform knurling or burnishing. (National Acme Co., Booth 2115)

For more data circle No. 56 on postcard, p. 139

Jig Boring, Milling

Complex milling and boring in tool, die, and fixture work is done on this machine. Work clamps to



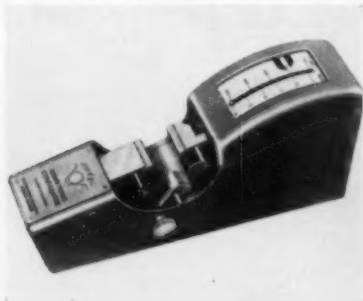
the table in one setup. All other operations are performed by setting the head, ram, column and saddles to pre-determined positions. Angular components have graduations

over the full 360° range; hand-wheels are graduated to 0.001 in. (Suburban Machine Co., Booth 917)

For more data circle No. 57 on postcard, p. 139

Thread Comparator

Machine operators can accurately measure screw thread pitch diameters with this comparator. Low in



cost, this model applies the wire method of measurement to permit quick inspection. (O-Vee Gauge Co., Booth 2005)

For more data circle No. 58 on postcard, p. 139

Balancing Machine

Capable of balancing individual parts with little set-up time, this unit is also useful for production. The machine reads unbalance di-



rectly in ounces or any other pre-selected unit. A seismic mounted vibration unit keeps floor noises and other disturbances at a minimum. Special drives permit speeds up to 36,000 rpm. (Tinius Olsen Testing Machine Co., Booth 1023)

For more data circle No. 59 on postcard, p. 139

Separating Machine

For barrel finishing shops, a new dual function separating machine not only separates processed parts from media, but it serves as a chip grader. The unit's two-deck screen

Is Sheet Metal Scrap a Problem in Your Plant?



An Orderly Salvage Program... Built Around a G-H Hydraulic Baler... *Could be the Solution!*

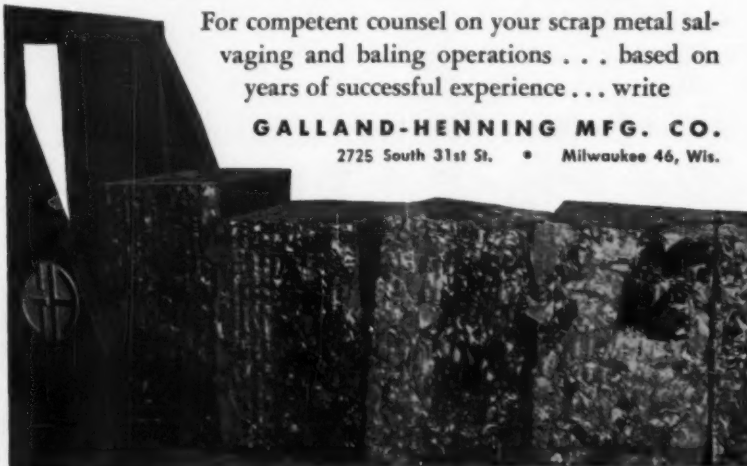
A well integrated scrap metal salvaging operation, built around the right kind and size of scrap metal baling press, may be the key to neat, orderly disposal of your sheet metal scrap . . . profitably . . . with minimum disturbance to production.

Galland-Henning Hydraulic Balers for sheet metal scrap are fast, powerful, rugged and efficient. They convert stampings, clippings and other light sheet metal scrap into dense compact bales always in demand by mills, foundries, and smelters.

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A 8727-35

New Materials Handling Ideas from Republic

SAVE TIME AND SPACE, IMPROVE HANDLING, SPEED SHIPPING AND RECEIVING OPERATIONS



THESE REPUBLIC STEEL BOXES ARE SAVING TIME, SPACE, AND MONEY at Kropp Forge Company, Chicago, Illinois, because they were engineered to the requirements of the job.

Kropp wanted a tough, sturdy steel box for shipping forgings to customers. It had to be easy to handle and stack. Republic Materials Handling Specialists worked closely with Kropp's production department in developing the design and construction features best suited to the application.

The boxes are used first on the production line for loading finished forgings. Corrugated steel construction takes the heavy loads in stride. Extra strength and rigidity keep the boxes new looking longer. A smooth steel channel around the top of each box eliminates sharp edges and projections—a safety

feature during loading and unloading operations.

Next, the boxes are picked up by fork truck and placed on carriers for immediate shipment to customers. Or, they may be taken to a storage area for future shipment.

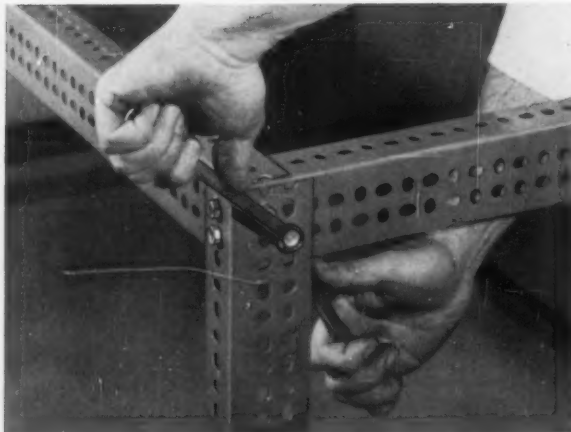
Fork channels with four-way entry provide easy handling in restricted space. Stacking brackets are securely welded to the top corners of each box permitting tiering to any practical height. This feature is a real space saver.

Kropp production men estimate the boxes will last three times as long as the previous type they were using.

Does this spark an idea for your operations? Republic specialists will help you design a special unit or suggest a standard type that could cut costs or simplify an operation. No obligation. Just mail the coupon.



VALUABLE FLOOR SPACE IS SAVED at Kropp Forge with Republic Steel Boxes. Stacking brackets, securely welded at each corner, permit tiering to any practical height. Four-way entry fork channels provide ease of handling in tight quarters.



NEW IDEA MEETS ALL FRAMING NEEDS. It's BILD-A-FLEX, Republic Berger Division's slotted construction angle. Use this versatile, durable product as "metal lumber" for racks, catwalks, scaffolds, special purpose tables and stands. Simply plan your assembly, cut BILD-A-FLEX, join with bolts. Horizontal and vertical slots on $\frac{3}{4}$ " centers make adjustment easy. BILD-A-FLEX is Bond-erized and finished with baked enamel after fabrication. Comes in convenient bundles of 10 angles, in .080 gage or .104 gage, 10- or 12-foot lengths, hardware included. Stores in same space as one 2" x 4" piece of lumber. Send the coupon for catalog loaded with ideas.

ANOTHER NEW REPUBLIC IDEA uses steel to protect steel in transit. Corrugated steel gondola car covers, designed and produced by Republic's Berger Division, provide damage-free shipping of coiled steel rolls. The covers afford excellent weather protection, shut out dirt, stop vandalism, eliminate replacement of short-lived tarps. Coil users benefit by eliminating need for paper wrappings on coils. Another cost-saving advantage is the fact that larger coils can be shipped in specially fitted cars. Republic Gondola Car Covers are 22 feet long, 6 feet wide and 6 feet high. Two covers are used with each 52-foot gondola car. Covers are easily handled by overhead or trackside crane. Request that your coil shipments be protected by Republic Coil Covers. Mail coupon today for full facts.



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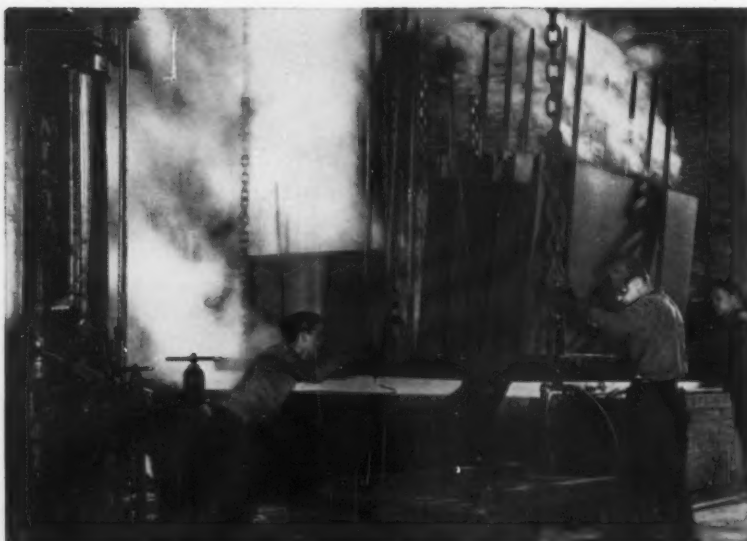
☐ Gondola Car Covers

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PROTECTS STEEL SAVES ACID

Pickling is smoo-o-ther when you use Houghton ACITROL as your pickling inhibitor. ACITROL's fast wetting action gets acid under scale in a hurry, and protects bare metal from acid attack instantaneously when scale loosens.

It's so chemically stable that high pickling temperatures don't break it down. And it is equally effective with both HCl and H_2SO_4 . ACITROL is an easy-to-use soluble liquid. No pre-mixing.

You can control pickling costs effectively with ACITROL, because its sure action prolongs the life of pickling baths and keeps attack on steel to a minimum. It promotes a bright, clear finish, keeps fumes down.

Get the details on ACITROL from your Houghton Man, or write for the latest product bulletin to E. F. Houghton & Co., 303 West Lehigh Avenue, Philadelphia 33, Pennsylvania.

And remember, there's a *full range* of superior products available from Houghton. If you have a processing problem, no matter what, mention it. There's a very good chance that Houghton service can help you find the quickest, most economical answer.

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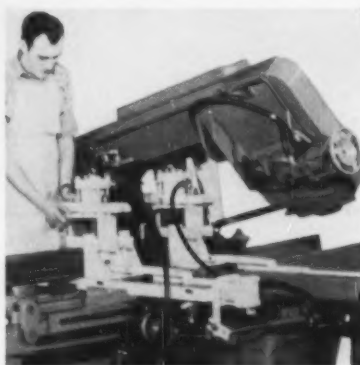
PREVIEWS

makes three simultaneous separations, handling up to two tons per hour. Special screen holders permit rapid screen changing. (Esbec Barrel Finishing Corp., Booth 954)

For more data circle No. 60 on postcard, p. 139

Power Saw

Cutting to length within thousandths for "slugging" operations is done on this cut-off saw. An automatic indexing feature makes this



possible. The narrow saw band produces a small kerf while the nesting guides hold a bundle of stock. (The DoALL Co., Booth 604)

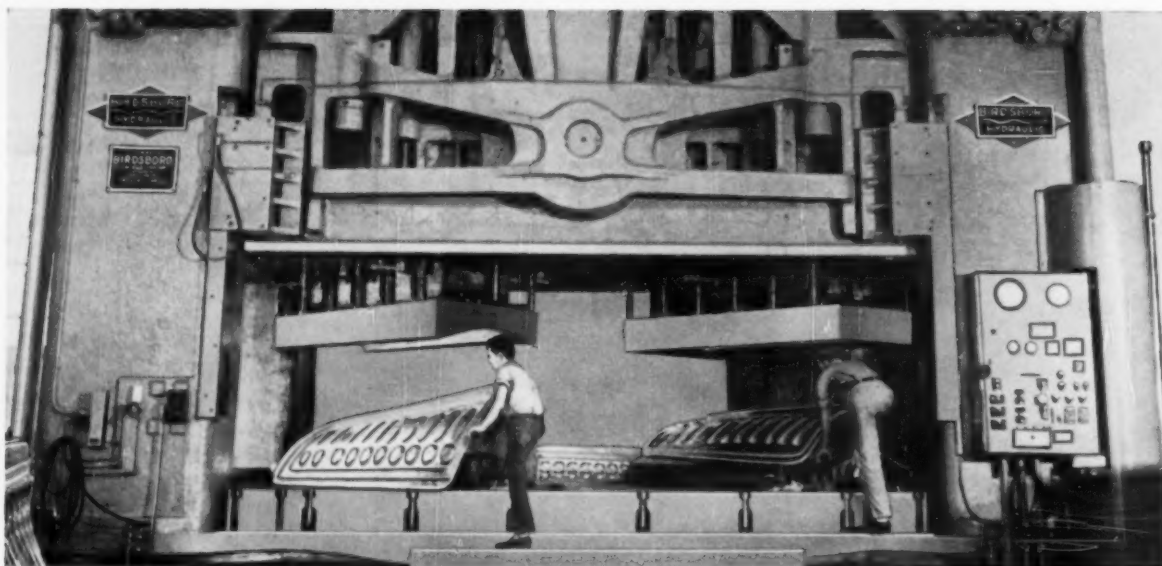
For more data circle No. 61 on postcard, p. 139

Height Indicator

With a range of 10 to 20 in., a height gage combines with 9-in. gage blocks to increase to any de-



sired height. The gage-block column actuates the dial indicator as it moves over the 1-in. range of the micrometer head. Rough positioning is reached by spinning the mi-



design versatility—the key to economy
in hydraulic presses by BIRDSBORO

BIRDSBORO
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• You can't afford a hydraulic press that cannot pay its way, and then some, in producing for today's market. As diversification and new methods change your production plans, presses with *advanced engineering* are the key to *versatility* that provides longer usable life. Birdsboro idea-power is geared to make your press everything you need for today, tomorrow and for much of the future. Ask your Birdsboro representative about it. *Main Office, Engineering Department and Plant: Birdsboro, Pa., District Office: Pittsburgh, Pa.*

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 STEEL CASTINGS • Weldments "CAST-WELD" Design • ROLLS: Steel, Alloy Iron, Alloy Steel

PACKAGED AIR HEATERS by THERMAL

Extreme compactness, high efficiency and versatility of operation are the chief characteristics of the THERMAL Type CA direct fired air heater. Designed around the high velocity THERMAL burner, it normally requires no refractory, since combustion is limited almost entirely to the burner itself. Adding to its versatility, the CA air heater performs equally well on gas, oil or combination firing and can be adapted to all pressure levels.

Type



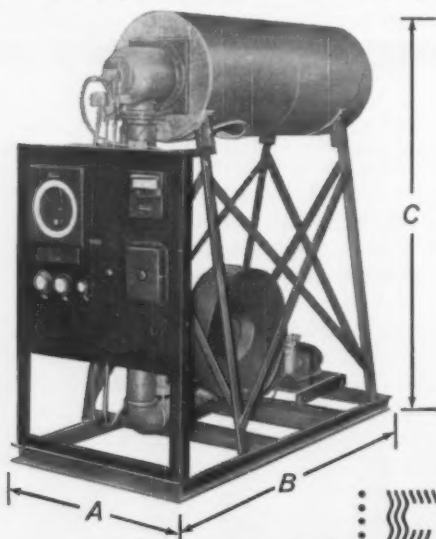
direct
fired

Type CA air heaters are most frequently sold as "packaged" units complete with all necessary safety and control apparatus. These units will provide outputs ranging from 200,000 BTU/hr to better than 30,000,000 BTU/hr and at temperatures from 300F to 1500F or higher.

TYPICAL SIZES . . .

Listed below are the overall dimensions of a few of the dozens of output, temperature, and flow combinations possible in these heaters. Figures are for atmospheric pressure units. Higher pressure heaters would be smaller.

| BTU/hr | AIR FLOW scfm | TEMP. IN °F | TEMP. OUT °F | A ft. | B ft. | C ft. |
|------------|------------------|----------------|-----------------|----------|----------|----------|
| 800,000 | 1,000 | 60 | 750 F | 2½ | 4½ | 4 |
| 2,500,000 | 5,000 | 60 | 500 F | 4 | 7 | 6 |
| 4,000,000 | 16,000 | 700 | 900 F | 7 | 11 | 8 |
| 10,000,000 | 8,500 | 60 | 1,000 F | 5½ | 10 | 8 |
| 15,000,000 | 10,000 | 60 | 1,200 F | 6 | 12 | 8 |



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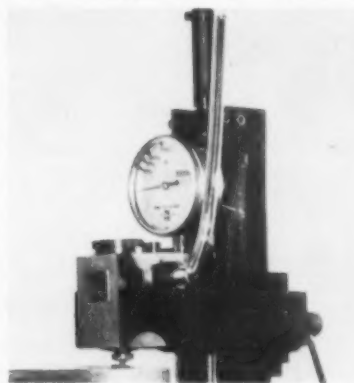
PREVIEWS

chrometer and reading the dial. Fine adjustment is then made and the height read on the micrometer thimble to 0.0001 in. (Brown and Sharpe Mfg. Co., Booth 122)

For more data circle No. 62 on postcard, p. 139

Hardness Tester

Designed to make end hardness tests on cylinders, die blocks or large castings, this machine has a

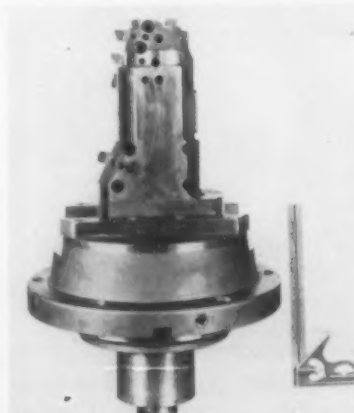


capacity of 29 in. with a 3½ in. throat. Rollers enable the 45-lb Brinell tester to be taken to the job. It uses a 5 or 10-mm carbide ball with loads ranging to 3000 kg. (King Tester Corp., Booth 437)

For more data circle No. 63 on postcard, p. 139

Feed-Out Heads

Especially designed for production machining, this special-purpose tool moves the cutter heads to and



from cutting position. As the tool block feeds out, a counterweight moves in the opposite direction to

counterbalance it. The main head is attached to the machine tool spindle. An auxiliary cylinder actuates the motion of the tool block. (Gairing Tool Co., Booth 318)

For more data circle No. 64 on postcard, p. 139

Surface Plate Checker

You can calibrate worn surface plates with this new instrument. Based on a "no calculation" method, the device permits calibra-

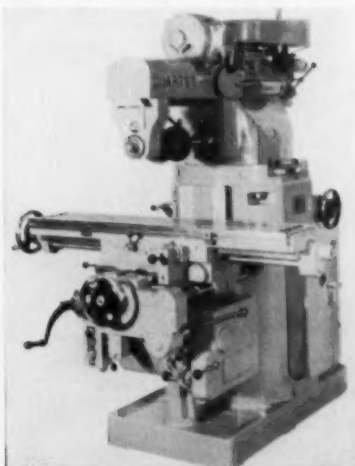


tion to 10 millionths. According to the maker, anyone who can read a dial indicator can use this unit with little instruction. (Rahn Granite Surface Plate Co., Booth 403)

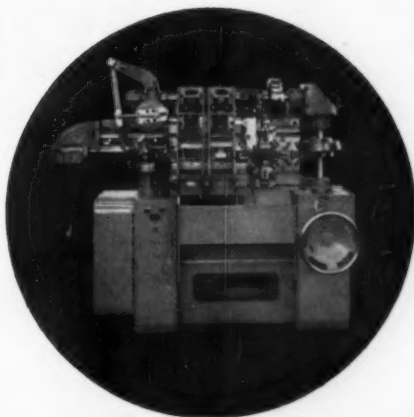
For more data circle No. 65 on postcard, p. 139

Milling Machine

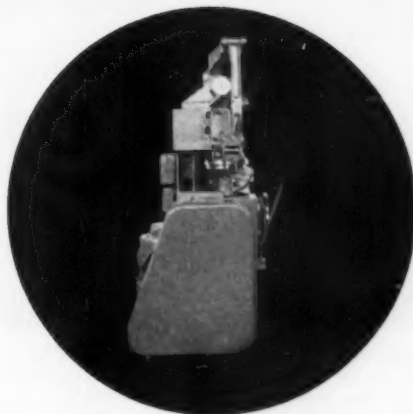
Called "a complete milling department in one machine" this unit can perform horizontal, vertical, an-



gular and universal milling. Both the 5-hp horizontal-spindle drive motor and the 2- or 3-hp vertical and angular spindle motor are variable-



$$\text{VERTICALITY} = \frac{\text{SETUP TIME}}{2}$$



The big story of the important new line of Torrington vertical 4-slides is savings:

Upward of 50 percent savings in setup time, tooling costs and floor space!

On a strict cost-accounting basis, you cannot afford not to investigate the profitability of replacement with the Torrington "Vertical Line" in the cost-critical field of wire and strip forming production equipment. Full data—or a demonstration—upon request.

THE TORRINGTON MANUFACTURING COMPANY

TORRINGTON, CONNECTICUT • VAN NUYS, CALIFORNIA • OAKVILLE, ONTARIO



Bucyrus-Erie Co. installs ARCAIR—saves time in Clean-up of Castings

Bucyrus-Erie Co. has installed Arcair for foundry cleaning room operations at its Erie (Pa.) Works.

With three conditioning booths equipped with Arcair torches, considerable time is being saved in casting clean-up—removal of riser stubs, flash, inclusions and defects. And operators learned the process easily and quickly.

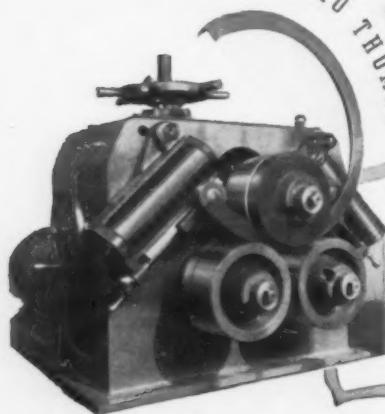
You too can save with Arcair! Basic simplicity—electric arc plus ordinary compressed air—makes Arcair the new, efficient, cost-cutting answer to your metal removing problems.

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describes the four
sizes and is yours for
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PREVIEWS

speed units. The vertical spindle also features variable feed rate over its 6 in. of quill travel. (U. S.-Burke Machine Tool Div., Booth 1261)

For more data circle No. 66 on postcard, p. 139

Flame Heating Machine

Selective flame heating is the feature of a new unit. Its flat bed permits amounting a variety of flame heads and fixtures. The heating

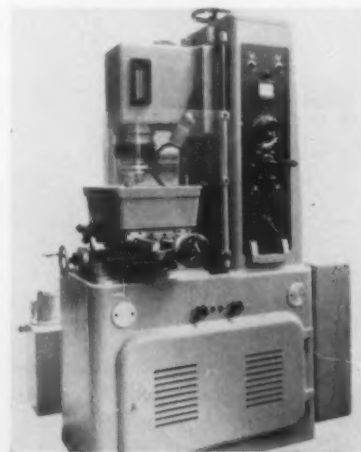



cycle is automatic. At the end of the cycle parts drop into a quench tank which is equipped with an agitator and heat exchanger. A built-in conveyor removes the parts from the quench. (Cincinnati Milling Machine Co., Booth 1555)

For more data circle No. 67 on postcard, p. 139

Spark Erosion Machine

Automatic feed and depth control permit this machine to operate unattended, with only an occasional





**You'll find Green River Steel
here where failure
would mean disaster**

The rotor-hub assembly on a helicopter is an extremely critical mechanism and the steel in it must withstand very high impact loads especially when blade pitch is changed. That's why orders so often read—"Green River only." Under the total management of Green River's new parent—Jessop Steel—the big arc-type furnaces at Owensboro, Kentucky are producing the only steel in the world processed under the Dornin patents. Tradenamed MACRO-CLEAN, these steels have the unmatched forging qualities and grain structure needed for vital aircraft assemblies.

When you need billets, bars or slabs of aircraft and commercial grade alloy, stainless or forging quality carbon steels, ask for Green River MACRO-CLEAN through any Jessop office. You'll be doing business with the steel industry's new Southern Star.

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• Automatic load cycling and strain cycling controls for continuous cyclic testing.

• Automatic read-out of yield strength and ultimate load in pounds or psi.

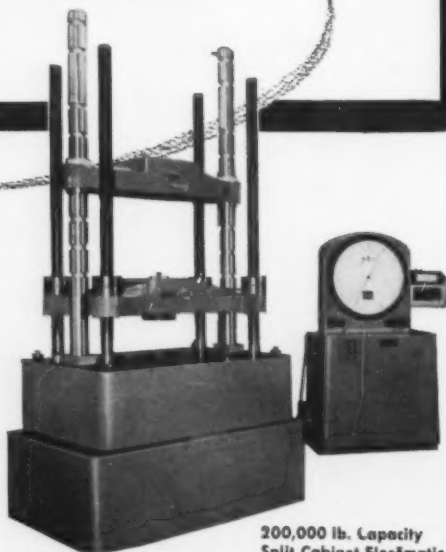
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• Available with built-in Electronic XY Recorder.

• Ample clearance for high temperature furnace, hot and cold cabinets and other accessories.

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2120 EASTON ROAD • WILLOW GROVE, PA.

Testing and Balancing Machines

PREVIEWS

check by the operator. It drills, pierces, profiles and cuts. The unit reproduces the shape of the electrode in the workpiece to close limits. Finishes of 12 to 15 micro-inches are obtainable. The electrical circuit uses no electronic parts. (Charmilles Engineering Works, Booth 1942)

For more data circle No. 65 on postcard, p. 139

Conductivity Meter

Using a simple hand detector pickup, a conductivity meter gives immediate readings of conductivity in absolute units. The instrument measures purity and hardness, sorts



mixed non-magnetic metals, and determines uniformity of heat treat. A small coil in the detector induces eddy currents in the test material, which in turn affect the impedance of the coil in proportion to the conductivity of the material. (Magnaflux Corp., Booth 102)

For more data circle No. 69 on postcard, p. 139

Comparator

A new comparator inspects leading and trailing edges of turbine blades and vanes. It uses two high intensity illuminating units and a hand operated blade orienting fixture with a built-in knife edge. The shadow shows on the viewing screen as a cross section of the blade edge contour. By moving the blade, its

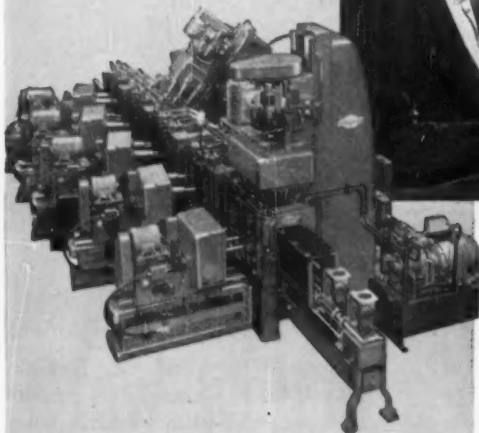
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with the **STRIPPIT**
FABRICATOR

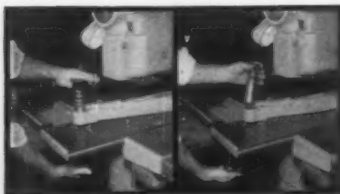
THE STRIPPIT FABRICATOR
— a single compact multi-purpose
Punch Press with quick-change tool
holder, quick-set gauging and stops.



Short run? Complicated pattern? If it's sheet metal up to $\frac{1}{4}$ " mild steel, if it's punching, notching or nibbling, it's profitable on a Strippit Fabricator!

Set up in minutes! Punches and dies are changed in 30 seconds or less, and Strippit guided punches need no aligning or adjusting. Back stop with precision gauge is instantly set by a locking knob. Self-tripping finger stops on gauge bars provide multiple stopping as the work is moved rapidly under the punch. A switch gives you single punching or 165-stroke-a-minute nibbling, and all tools are within quick reach in attached "file drawers" or shelves. The Fabricator is more than a one-machine shop—it's a whole system of quick-change, high-profit fabrication used by thousands of shops.

What's more, you can add the Strippit Positive Duplicator for high-speed punching in medium runs — plus the Dupl-O-Scope to punch Duplicator templates right from the drawing, in a few minutes. Write today for details and demonstration at your plant by the Strippit mobile unit. Warehouse stocks in Chicago and Los Angeles.



TOOL HOLDER is pulled out, for instant removal of die and punch assembly, ready for the next interchangeable tool. $1\frac{1}{4}$ " diameter capacity holder shown, $3\frac{1}{2}$ " diameter holder also available.



WALES STRIPPIT COMPANY

202 Buell Road, Akron, New York

In Canada: Strippit Tool & Machine Limited, Brampton, Ontario

PREVIEWS

entire length can be inspected.
(Jones & Lamson Machine Co.,
Booth 1504)

For more data circle No. 70 on postcard, p. 139

Hydraulic Power Unit

Operating on 90-psi air pressure, this portable unit develops up to 7000-psi oil pressure. Delivering high pressure oil at a rate of 2 quarts per cycle, it will actuate



equipment such as the portable broach puller shown. This permits broaching drilled or punched holes to square, oval, splined, notched or irregular shapes. A single pass mirror finishes round holes to ± 0.0002 in. (Chicago Pneumatic Tool Co., Booth 1804)

For more data write in 71 on postcard, p. 139

Box Jig

Combining aluminum, cast iron, and steel, new box jigs are lightweight and easy to handle. Cast iron legs are interlocked with the aluminum walls. Projections permit using head type bushings on any side of the box. One hand operation is possible due to a thumb screw arrangement which releases the leaf. The plastic handle may be attached to any side, to accommodate the work and permit universal tumble action. A range of 47 sizes are available. (Standard Parts Co., Booth 1173)

For more data write in 72 on postcard, p. 139



NEW

LIMA TYPE 84-T TRUCK CRANE

has
high capacity,
low weight



LIMA's new 4-axle truck crane, Type 84-T, of 70-ton capacity, sets a new standard in the industry. High-strength T-1 steel is used throughout in the truck chassis and components for greater strength with less weight.

The truck chassis consists of two full box section members, joined by seven cross members. Special features include easily removable pin-on-type front and rear outrigger boxes; roller mounted outrigger beams; full length combination deck-fender design; large, full vision operator's cab; frame-width engine compartment; hydraulic steering on all four front wheels. Working weight of the Type 84-T is 121,000 lbs. Minimum stripped weight for highway travel, 85,660 lbs.

The compact rotating unit is designed for heavy-duty service. All motions are air-controlled. Deck gears and reversing bevel gears are enclosed and pump-lubricated. Other LIMA Type 84-T features are: oversize brakes and clutches, liberal use of anti-friction bearings on all main shafts and cable drums, large two-shoe type swing clutches, dual boom hoist drums, power-raised and lowered high telescopic type gantry which reduces travel height to 13'-8", one-piece rear counterweight easily removed to meet highway limitations and torque converter power take-off.

For further information, see your nearby LIMA distributor; or write Construction Equipment Division, Baldwin-Lima-Hamilton Corporation, Lima, Ohio.

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ASTE TOOL SHOW

Tool Experts Meet

Converging on Philadelphia will be some 35,000 persons to attend the American Society of Tool Engineers' 26th Annual Convention and Tool Show, May 1-8.

Nearly 500 exhibitors will participate. Over 100 technical papers will be presented.

■ Next week tool engineers, manufacturing executives and production men will be looking for answers to the perennial question of how to produce more goods at lower cost. They'll have plenty of chance when they attend the 1958 ASTE Tool Show and 26th Annual Convention at Philadelphia's Convention Center.

Technical Highlights—Over 100 technical papers and panel discus-

sions are scheduled. Speakers are recognized experts in plant management, automation, precision control, numerical control, cutting and grinding.

Topics for the conferences range throughout the field of manufacturing from first design to final inspection. Some highlights will cover: tooling behind the guided missile program, automation for the small plant, metal-cutting research, diamond tools, titanium and European tool engineering.

Two special events will stress progress in numerical control, and tooling for metal powder parts. A Metal-Cutting Review Seminar will provide a comprehensive review of basic information on metal-cutting.

A full schedule of plant tours has been arranged for visiting a wide variety of manufacturing facilities.

ASTE TECHNICAL PROGRAM

Thurs., May 1—3:00 p.m.

Ballroom, Convention Center
TOOL ENGINEERING FOR AIRCRAFT PRODUCTION I

Chairman—J. J. McDevitt, C. H. Wheeler Mfg. Co.

Magnesium in Aircraft Tooling, by K. F. Melde, Boeing Airplane Co.

A Tool Engineer's Approach to the B-58 Weapon System, by R. A. Fuhrer, General Dynamic Corp.

Thurs., May 1—8:00 p.m.

North Garden, Bellevue-Stratford Hotel
TOOL ENGINEERING FOR AIRCRAFT PRODUCTION II

Chairman—E. V. C. Kapp, The Martin Co.

Weight Savings in the Manufacture of Aircraft Engine and Missile Parts by Cold Roll Forming

from Thick to Thin Material by A. A. Merry and J. G. Campbell, Pratt & Whitney Div.

Safety Engineering as a Function of Human Engineering by M. A. Pape, Lockheed Aircraft Corp., R. W. Faubion, North American Aviation, and N. Kaye, Kaye-Pape Associates.

Fri., May 2—9:30 a.m.

Room 200, Convention Center
PLASTIC TOOLING

Chairman—D. B. Spatz, York-Shipley, Inc.

For Tools and Dies — New Epoxy-Fiber Compositions by A. P. Mazzucchelli, Bakelite Co.

Our Experience in the Use of Plastics for Making Duplicate Die Models, Engineering Checking Fixtures and Prototype Tools by A. E. Vallier and H. L. Wyatt, Ford Motor Co.

Shell Molding and Tool Engineering by O. W. Winter, Beardsley and Piper Div.

Fri., May 2—9:45 a.m.

Ballroom, Convention Center
STEEL—FORGINGS AND EXTRUSIONS

Chairman—R. L. Smith, Standard Pressed Steel Co.

Steel Forgings, Why and How by A. O. Schaefer, Pencoyd Steel & Forge Corp.

Design Features and Cost Benefits of Hot Extruded and Cold Drawn Steel by R. L. Hugo, Jones & Laughlin Steel Corp.

Fri., May 2—2:00 p.m.

Ballroom, Convention Center
NUCLEAR ENGINEERING

Chairman—J. E. McAleer, Erco Div., ACF Inc.

Standardization in the Nuclear Industry by H. H. Hausner, Penn-Texas Corp.

Unique Aspects of Nuclear Component Manufacture by H. C. Amsberg, Westinghouse Electric.

Fri., May 2—2:30 p.m.

Room 200, Convention Center
CUTTING TOOLS

Chairman—D. Betts, Standard Pressed Steel Co.

Tool Steel Toughness — Rated by a New Method of Measurement by G. Steven, A. E. Nehrenberg



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PROGRAM

and V. D. Chandhok, Crucible Steel.

Basic Developments in Carbide Tooling by W. L. Kennicott, Kennametal, Inc.

Fri., May 2—8:00 p.m.

Burgundy Room, Bellevue-Stratford

CERAMIC TOOLS

Chairman—C. R. Skord, Stand-

ard Pressed Steel Co.

New Developments in High-Velocity Machining by W. B. Kennedy, Watertown Arsenal.

Characteristics and Experimental Performance of Certain New Ceramic Tool Compositions by A. G. King and W. M. Wheildon, Norton Co.

Fri., May 2—8:15 p.m.

Oak Room, Bellevue-Stratford



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TOOL ENGINEERING RESEARCH I

Chairman—H. Di Paul, Standard Pressed Steel Co.

Role of Research and Development in Gear and Spline Production Equipment by R. S. Hildreth, Michigan Tool Co.

Research Report on High-Speed Circular Sawing of Aluminum Alloys by O. H. Nuss, DeWalt Div., American Machine & Foundry Co.

Sat., May 3—9:45 a.m.

South Garden, Bellevue-Stratford
GENERAL TOOL ENGINEERING I

Chairman — F. G. Holzhausen, Lepel High Frequency Laboratories, Inc.

Static Switching for the Mechanical Engineer by A. H. Wolfson, Pratt & Whitney, Inc.

Vitrifiable Silicate Tooling for High Temperature Plastics by J. D. Stillman, Convair Div., General Dynamics Corp.

Sat., May 3—10:00 a.m.

North Garden, Bellevue-Stratford
METAL-CUTTING RESEARCH I

Chairman — F. H. Glanding, University of Pennsylvania.

Mechanism of Chip Formation in Metal-Cutting, and Some Thermal and Physical Aspects of Metal-cutting, both papers by D. N. Gideon, R. Simon and H. J. Grover, Applied Mechanics Div., Battelle Memorial Institute.

Sat., May 3—1:30 p.m.

South Garden, Bellevue-Stratford
SURFACE FINISHES

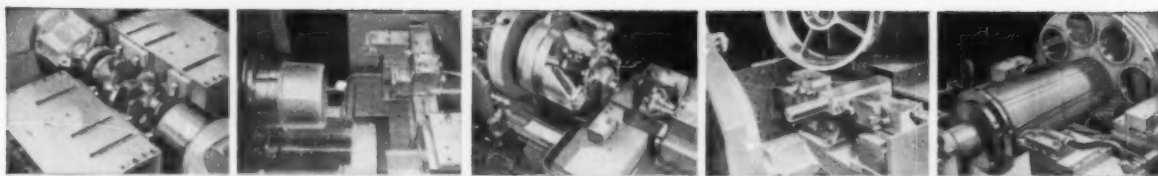
Chairman — LeR. S. Paulson, Link-Belt Co.

Gear Tooth Honing — a New Approach to Improving Gear Surface Finish by B. F. Bregi, National Broach & Machine Co.

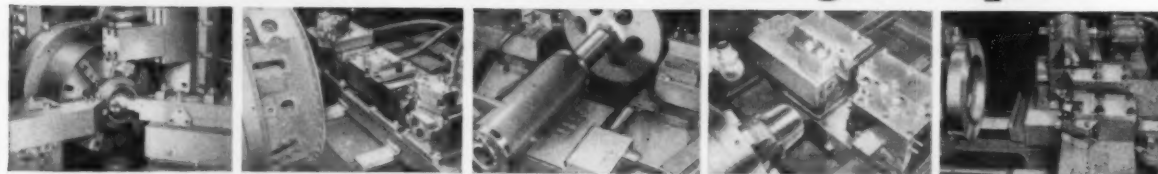
Obtaining Specified Finishes by Honing by B. R. McConnell, Sunnen Products Co.

Sat., May 3—2:00 p.m.

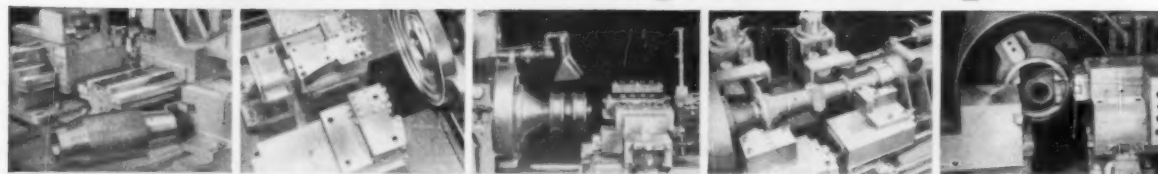
North Garden, Bellevue-Stratford
METAL-CUTTING RESEARCH II



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clean every time. Furthermore, we have never had a thread failure in the field traceable to tubing quality."

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PROGRAM

Chairman—G. E. Smith, Kennametal, Inc.

Present Knowledge of Cutting Fluids by S. L. Cosgrove and R. W. Greenlee, Chemistry Dept., Battelle Memorial Institute.

Influence of Metallurgical Properties on Metal-Cutting Operations by F. W. Boulger, Div. of Ferrous Metallurgy, Battelle Memorial Institute.

Sat., May 3—8:00 p.m.

South Garden, Bellevue-Stratford
GENERAL TOOL ENGINEERING II

Chairman—G. L. Cummings, W. E. Shipley Machinery Co.

New Manufacturing Techniques for Hydraulic Servo Valves by E. M. Hakanson, Machine Tool Div., Sheffield Corp.

The Use of Ultrahigh-Speed 150-horsepower Lathe for Machinability Studies by H. J. Sickmann, Metallurgical Products Dept., General Electric Co.

Mon., May 5—9:45 a.m.

Room 300, Convention Center
TOOL ENGINEERING RESEARCH II

Chairman—H. W. Gross, Dean of Spring Garden Institute

A New Approach to Some Relationships in the Theory of Metal-Cutting by M. Kronenberg, Consulting Engr.

Machine Tool Dynamometers, Their Design and Application by E. K. Henriksen, Convair Div., General Dynamics Corp.

Mon., May 5—10:00 a.m.

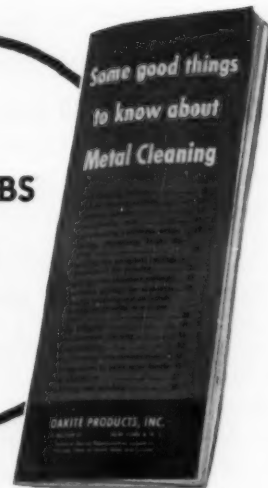
Room 200, Convention Center
GENERAL TOOL ENGINEERING III

Chairman—H. W. Yeager, Jr., The Budd Co.

Automatic Size Control For Centerless Grinders by A. Parnes, Airborne Instruments Laboratory, Inc.

The Significance of the Surface Finish Produced by Electro-Discharge Machining by C. H. Good, Micrometrical Development Corp.

WHICH METAL-CLEANING JOBS WOULD YOU LIKE TO IMPROVE?



- ☐ Are you cleaning metal in the most economical way? See page 9 of Oakite's FREE booklet on Metal Cleaning.
- ☐ Are you cleaning metal the fastest way? See page 12.
- ☐ Do you need room-temperature cleaning combined in one operation with temporary rustproofing? See pages 12 and 14.
- ☐ Do you know the advantages of alkaline pickling? See page 21.
- ☐ Have you compared the values of iron phosphate coating and zinc phosphate coating in preparation for painting? See pages 22 and 25.
- ☐ Can you use a cleaner that removes rust and oil at the same time; often eliminating all need for pickling? See page 30.
- ☐ Do you have trouble stripping epoxy resins, pigment residues, phosphate coatings and under-paint rust? See page 31.
- ☐ How do you clean parts that are too large to be soaked in tanks or sprayed in machines? See page 31.
- ☐ Are you getting full profit out of your finishing barrels? See page 32.
- ☐ What do you do when oversprayed paint neither floats nor sinks in your paint spray booth wash water? See page 35.
- ☐ Do you need better protection against rusting in process or in storage? See page 37.

FREE For your copy of "Some good things to know about Metal Cleaning" write to Oakite Products, Inc., 30H Rector Street, New York 6, N. Y.



Technical Service Representatives in Principal Cities of U.S. and Canada
Export Division Cable Address: Oakite

PROGRAM

Mon., May 5—2:00 p.m.

Room 300, Convention Center
DIAMOND TOOLS I

Chairman—W. O. Dick, Eddy-stone Div., Baldwin-Lima-Hamilton Corp.

Oriented Diamonds In Connection with Single-Point Tool Applications by J. B. Speirs, American Coldset Corp.

Proper Grain Orientation Improves Diamond Cutting Tool Life by J. Taeyaerts, Precision Diamond Tool Co.

Tues., May 6—9:45 a.m.

Room 300, Convention Center
DIAMOND TOOLS II

Chairman—J. Harris, Standard Pressed Steel Co.

Oriented Diamonds Give Maximum Performance in Formed Dressing Tools by J. Klipper, Clip-

per Diamond Tool Co., Inc.

The Oriented Vector in Diamond Dressing Tools by H. C. Miller, Super-Cut, Inc.

Tues., May 6—10:00 a.m.

Room 200, Convention Center
NEW DRILLING TECHNIQUES

Chairman—W. Reber, Homelite Div., Textron, Inc.

The Spiral Point Drill—A Self-Centering Drill Point Geometry by H. Ernst, and W. A. Haggerty, Cincinnati Milling Machine Co.

Production Drilling and Reaming of Precision Holes with Gun-Type Tools by H. Gregg, Star Cutter Co.

Tues., May 6—3:00 p.m.

Room 300, Convention Center
DIAMOND TOOLS III

Chairman—J. L. Geist, Lester, Pa.

A Rapid Method for Setting Oriented Diamonds In Tools by R.

G. Weavind, C. J. Guykers and A. R. Roy, Crown Mines.

The Orientation of Diamonds for Tools by Means of an X-Ray Image Intensifier Tube by J. F. H. Custers, Crown Mines.

Tues., May 6—8:30 p.m.

Pennsylvania Room, Sheraton Hotel
EUROPEAN TOOL ENGINEERING

Chairman—J. L. G. FitzPatrick, Staten Island Community College.

Recent European Metal-Cutting Investigation by M. C. Shaw, Massachusetts Institute of Technology.

Tool Engineering in Europe by J. W. Greve, The Tool Engineer.

Wed., May 7—9:30 a.m.

Ballroom, Convention Center
AUTOMATION I

Chairman—W. Briner, Standard Pressed Steel Co.

Machinery and Automation by J. C. Keebler, Automation.



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with the lasting color beauty and textured finish of

Masland Duran Clad
VINYL LAMINATED TO METAL

Unlimited design opportunities are opened up by this versatile, semi-rigid vinyl surfacing. Combining practical engineering with high-fashion beauty, it provides a "built-in" finish that remains unimpaired throughout processing operations. Even shearing, crimping, punching or drilling won't damage texture or color. Many distinctive, easy-to-clean colors. For real competitive advantages put Masland Duran Clad in your product design plans.

Industrial Products Division

THE MASLAND DURALEATHER CO.
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New design Brown & Sharpe Automatic Screw Machines

save up to 92% in production time

How much better production can you get from new design B&S Automatics? The De Vilbiss Company now has comparison figures on a wide variety of jobs transferred from old machines to new No. 00 Automatics. Each job shows production greatly increased over that obtainable with previous equipment. In many cases — one, two, and sometimes three secondary operations have been eliminated, ending the need for the extra machines previously required.

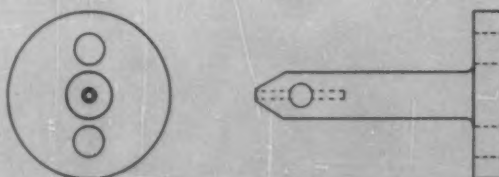
The man hour savings for some parts run as high as 92%. Along with these gains, the new No. 00 Automatics maintain the closest tolerances for size and concentricity, and meet the highest standards for surface quality.

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Production time saved — 328 hrs.

| Part | Quantity per run | Material |
|---|--|---------------------------------------|
| Nozzle Cleaner Body | 18,560 pcs. | $\frac{1}{32}$ " dia. Brass |
| With previous equipment 357 man hrs. | Production time — all operations 91% SAVING | With new design No. 00 29 man hrs. |

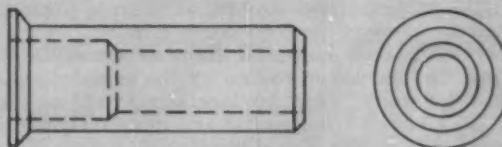


on new B&S No. 00 Automatic with
Special Offset Drilling Att. (2) Revolving Turret Drilling Att.
Cross Drilling Att. Spindle Brake Burring and Drilling Att.

| Cutting RPM | Sec. per piece | Pieces per hr. |
|-------------|----------------|----------------|
| 7200 | 10 | 360 |

Production time saved — 71 hrs.

| Part | Quantity per run | Material |
|--|--|--------------------------------------|
| Valve stem tail piece | 11,675 pcs. | $\frac{3}{4}$ " dia. Brass |
| With previous equipment 77 man hrs. | Production time — all operations 92% SAVING | With new design No. 00 6 man hrs. |



on new B&S No. 00 Automatic with
Burring and Drilling Att.

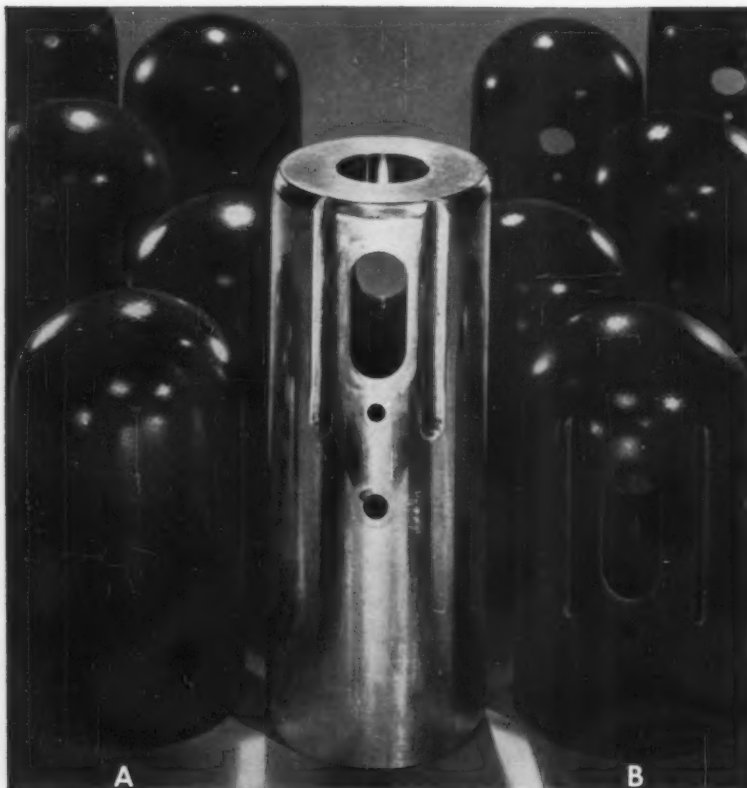
| Cutting RPM | Sec. per piece | Pieces per hr. |
|-------------|----------------|----------------|
| 7200 | $3\frac{1}{2}$ | 1026 |

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Brown & Sharpe >



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Rough gas cylinder cap (A), is about to go on Punch and Score Mandrel. Cap (B), has just come off Mandrel. Greater resistance to rounding of 90° crimped edging of flutes by Vulcan Vairloy Tool Steel than by MnOH steel increases life of Punch and Score Mandrel, center.

More than **77% LONGER TOOL LIFE** at Taylor-Wharton with **Vulcan Vairloy Tool Steel!**

Vulcan sales engineers helped reduce tool replacement costs for Taylor-Wharton Co., division of Harsco Corp., Easton, Pa.—manufacturers of compressed gas cylinders. Working closely with Taylor-Wharton engineers, they recommended Vulcan Vairloy Tool Steel for use on tooling for the manufacture of gas cylinder caps. Net result? Tool life lengthened to 15 months—an increase of 77%. Taylor-Wharton had experimented continuously for many years on a variety of tool steels. Only Vulcan Vairloy provided a solution to their main problem.

Vulcan Vairloy offers the best non-deforming properties attainable because it is an air hardening die steel. It also possesses much better wear-resistance than oil hardening die steels. On the other hand, its low hardening temperatures (1500°-1600° F.) permit heat treating in a much wider variety of furnaces than other air hardening steels.

For the name of your nearest Vulcan representative, write, wire, or call collect: Vulcan-Kidd Steel Division, H.K. Porter Company, Inc., Aliquippa, Pa.

H. K. PORTER COMPANY, INC.
VULCAN-KIDD STEEL DIVISION

PROGRAM

Automation—The Manufacturing, Sales, Engineering Triangle by W. C. Allen, Westinghouse Electric.

Wed., May 7—9:45 a.m.

Room 200, Convention Center
TITANIUM I

Chairman—A. P. Collier, Westinghouse Electric Corp.

On Machining Titanium by G. W. Bauer, Mallory Sharon Titanium Corp.

Design Consideration for Cold Extrusion of Titanium by A. M. Sabroff, A. Sannicandro, P. D. Frost, Battelle Memorial Institute.

Wed., May 7—10:00 a.m.

Room 300, Convention Center
CUTTING TOOL MATERIAL II

Chairman—W. K. Neff, Allegheny Ludlum Steel Corp.

Cutting Tool Materials of the Future by W. Reich, Metallurgical Products Dept., General Electric.

Today's Cutting Tool Materials by G. A. Roberts, Vanadium-Alloys Steel Co.

Wed., May 7—1:30 p.m.

Ballroom, Convention Center
AUTOMATION II

Chairman—J. P. Wearn, Westinghouse Electric Corp.

Types of Automatic Assembly Equipment by L. L. Lee, LeMaire Tool & Mfg. Co.

Automatic Manufacturing with the Integrated Line by D. A. Cargill, Cargill Detroit Corp.

Wed., May 7—2:00 p.m.

Room 200, Convention Center
GENERAL TOOL ENGINEERING IV

Chairman—A. R. Diamond, Consultant, Philadelphia, Pa.

Gaging Screw Threads For Acceptability by E. G. Gabbey, O-Vee Gauge Co.

Frictional Behavior of Metals and Plastics by A. O. Schmidt, Kearney & Trecker Corp. and E. J. Weiter, College of Engineering, Marquette University.

Thurs., May 8—9:30 a.m.

South Garden, Bellevue-Stratford
AUTOMATION III

Chairman—S. P. Grant, Erco
Div., ACF, Inc.

**High Production Automation
through Low-Speed Mechanisms** by
J. Wille, Motorola, Inc.

**Application of Weldamaton
Techniques to Welding Processes**
by J. H. Brems, Welding Machine
Div., Expert Die & Tool Co., Inc.

Thurs., May 8—9:45 a.m.

North Garden, Bellevue-Stratford
**GENERAL TOOL ENGINEER-
ING V**

Chairman—J. H. Zeder, Jr., The
Budd Co.

Capacity of Lathe Chucks by E.
J. Weller, General Electric Co.

**What Will Mechanical Tool
Holders Do For You?** by H. E.
York, General Electric Co.

**Economic Advantages of Prog-
ressive Dies** by G. E. Gault, Ehr-
hardt Tool & Machine Co.

Thurs., May 8—1:30 p.m.

South Garden, Bellevue-Stratford
AUTOMATION IV

Chairman—M. R. Lettieri, Ben-
dix Aviation Corp.

**Simplified Setups For Job Shop
Automation** by R. Sollohub, and R.
Coen, General Electric Co.

**Automated Special Machines for
Low Production Parts** by H. N.
Maynard, Snyder Tool & Engr. Co.

**Can the Small Plant Afford Auto-
mation?** by R. Eshelman, Iron Age.

**Automation as Applied To Small
Lot Production** by W. O. Miller,
Textile Machine Works.

Other Noteworthy Events

Metal Cutting Review Seminar,
May 1-2.

Panel—**Metal Cutting Research,**
May 3.

Guided Missile Program, May 5.
Symposium—**Numerical Control,**
May 5-6.

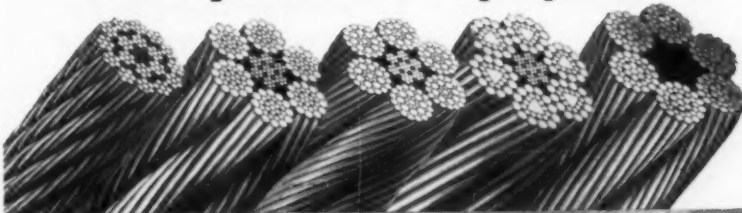
Symposium—**Tooling for Metal
Powder Parts,** May 6.

**2nd Annual Eli Whitney Memo-
rial Lecture, Luncheon,** May 6.

Panel—**Creative Standardization,**
May 7.

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is this your wire rope problem?



**Matching type or construction to the job
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FREE RED-STRAND BULLETIN NO. 107 TELLS HOW.**

The ideal wire rope for guying a mast would go to pieces in jig time if used as a hoist rope. Similarly, the best rope for the latter would soon be ruined by bending fatigue if used on equipment which has too small sheaves or requires numerous reverse bends. How to coordinate wire rope and the job to insure maximum service life and operating efficiency in all such variations is very clearly told in Service Bulletin No. 107. Copies free on request. Write H. K. Porter Company, Inc., Leschen Wire Rope Division, 2727 Hamilton Ave., St. Louis 12, Missouri.



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ASTE TOOL SHOW EXHIBITORS

Located in Philadelphia's Convention Hall, the ASTE Tool Show will be open every day from 9:00 am to 6:00 pm from May 1-8 with exception of Sunday, May 4.

| Exhibitor | Booth |
|---|-------|
| A | |
| AA Gage Co. | 532 |
| Aaron Machinery Co. | 1571 |
| Accurate Bushing Co. | 1825 |
| Ace Drill Bushing Co., Inc. | 2052 |
| Ace Drill Corp. | 432 |
| Adamas Carbide Corp. | 1600 |
| Adcock & Shipley, Ltd. | 1456 |
| Advance Products Corp. | 2111 |
| Aero Service Corp. | 433 |
| Airborne Instrument Laboratory | 1918 |
| Airetool Mfg. Co. | 1340 |
| Alameda Gage Co. | 409 |
| Alina Corp. | 1774 |
| Alkon Products Corp. | 1154 |
| Almco Div. Queen Stove Works | 2101 |
| Aloris Tool Co., Inc. | 2045 |
| Alsop Engineering Corp. | 1062 |
| Alzmetall Machine Tool Factory, Germany | 1456 |
| AMF DeWalt, Inc. | 1572 |
| AMF Tool Div., American Machine & Foundry Co. | 1164 |

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|--|------|
| American Cam Co., Inc. | 1067 |
| American Coldset Corp. | 1860 |
| American Cystoscope Makers | 334 |
| American Drill Bushing Co. | 1749 |
| American Herforder Corp. | 1307 |
| American Pullmax Co., Inc. | 1722 |
| American SIP Corp. | 1734 |
| American Standards Assn. | 1910 |
| B. C. Ames Co. | 227 |
| Amplex Div., Chrysler Corp. | 1839 |
| Anderson & Sons, Inc. | 613 |
| Anderson Oil & Chemical Co. | 331 |
| R. B. Annis Co. | 1077 |
| The Apex Tool & Cutter Co. | 509 |
| Armstrong Bros. Tool Co. | 308 |
| The Aro Equipment Corp. | 1810 |
| Arwood Precision Casting Corp. | 628 |
| Assoc. American Trading Div., Syrkus & Guttman, Inc. | 512 |
| Atlantic Machine Tool Works | 1914 |
| Associated Technical Sales Co. | 2134 |
| Austin Industrial Corp. | 1471 |
| Auto Load Inc. | 335 |
| Automatic Switch Co. | 1838 |
| Automotive Industries | 231 |

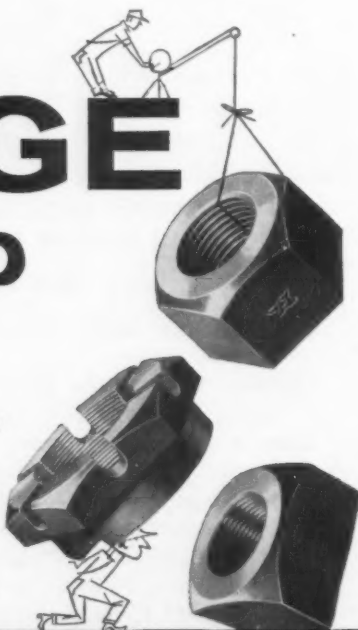
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| B | |
| Eric R. Bachmann Co., Inc. | 704 |
| Barber-Colman Co. | 1255 |
| Barer Engineering & Machinery Co. | 1370 |
| Barker Engineering Co. | 1258 |
| Barry Controls Inc. | 716 |
| Bausch & Lomb Optical Co. | 119 |
| Beaver Tool & Engineering | 829 |
| Bedford Gear & Machine Products | 2008 |
| Bendix Aviation Corp., Research Laboratories Div. | 936 |
| Besly-Welles Corp. | 632 |
| Bischoff Chemical Corp. | 2148 |
| Black Drill Co., Inc. | 1051 |
| Blackhawk Mfg. Co. | 413 |
| Black & Webster, Inc. | 1457 |
| Edward Blake Co., Inc. | 1646 |
| E. W. Bliss Co. | 528 |
| Henry P. Boggis & Co. | 1058 |
| Boice Gages, Inc. | 234 |
| Bokum Tool Co., Inc. | 414 |
| Boyar-Schultz Corp. | 1539 |
| Branson Ultrasonic Corp. | 745 |
| Bridgeport Machines, Inc. | 1705 |
| Briney Mfg. Co. | 203 |
| The Bristol Co. | 1447 |
| British Industries Corp. | 1238 |
| Brown & Sharpe Mfg. Co. | 122 |
| Charles Bruning Co., Inc. | 345 |
| Bryant Gage & Spindle Div., Bryant Chucking Grinder Co. | 123 |
| Buck Mfg. Co. | 2141 |
| Buck Tool Co. | 804 |
| Buckeye Tools Corp. | 705 |

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| C | |
| The Carpenter Steel Co. | 725 |
| Carr Lane Mfg. Co. | 1066 |
| Carter Controls, Inc. | 1244 |
| Case-Maul Mfg. Co., Inc. | 1365 |
| Cawi Machine Co., Inc. | 972 |
| Cerro De Pasco Sales Corp. | 1270 |
| The Challenge Machinery Co. | 1073 |
| Champion Pneumatic Machinery Co. | 405 |
| Charmilles Engineering Works, Switzerland | 1942 |
| Chicago Pneumatic Tool Co. | 1804 |
| Chicago Tramrail Corp. | 1745 |
| Chilton Co. | 231 |
| Cincinnati Milling Machine Co., Process Machinery Div. | 1555 |
| Cincinnati Sub Zero Products | 976 |
| Circular Tool Co., Inc. | 326 |
| Cities Service Petroleum Inc. | 108 |
| Robert H. Clark Co. | 1901 |

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| Die Casting | |
| Rotor Ingot..... | 100 and A100 alloy |
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Walnut 5-0490
Jackson, Mich.
State 2-4900
Kansas City
Plaza 3-2055
Los Angeles
Dunkirk 5-3231
Memphis
Jackson 7-2571
Miami
Plaza 7-0635
Milwaukee
Broadway 3-8266
Minneapolis
Union 9-9289
New Haven
Spruce 7-1491
New York
Plaza 1-4540
Philadelphia
Mohawk 4-6100
Pittsburgh
Grant 1-3855
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Parkview 6-0247
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"The wide range of speeds available on this machine is definitely an advantage."

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"We are able to select the correct feed for all parts run on the machine."

DINABRAKE MOTOR:

"Speeds production."

HP AMMETER:

"Enables the operator to run the machine at full capacity."

DESIGN:

"Compact, provides ease of set-up."

ACCURACY:

"Good."

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| Cleco Air Tool Div., Reed Roller Bit Co. | 1871 |
| Clementina Ltd. | 1938 |
| Cleveland Cutter & Reamer Co. | 637 |
| Cleveland Grinding Machine Sales | 838 |
| Cleveland Instrument Co. | 953 |
| Cogsdill Tool Products, Inc. | 1243 |
| Collins Microflat Co. | 400 |
| Colonial Mfg. Co., Inc. | 1169 |
| Columbia International Corp. | 1356 |
| Commander Mfg. Co. | 945 |
| Connecticut Tool & Engineering | 1860 |
| Cooper Weymouth, Inc. | 1357 |
| Covel Mfg. Co. | 136 |
| Arthur A. Crafts Co., Inc. | 115 |
| Crodian & Co. | 1853 |
| Crystal Lake Grinders | 1453 |
| The Cushman Chuck Co. | 1439 |
| Custanite Corp. | 2043 |
| Cyclodynamics Inc. | 1024 |

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| Dake Corp. | 1744 |
| Danly Machine Specialties, Inc. | 1505 |
| Davis Boring Tool Div., Giddings & Lewis Machine Tool Co. | 1517 |
| A. G. Davis Gage & Engineering | 144 |
| Dayton Perforators, Inc. | 2106 |
| Dazor Mfg. Corp. | 1675 |
| Denison Engineering Div., American Brake Shoe Co. | 1012 |
| Detroit Reamer & Tool Co. | 1054 |
| Detroit Stamping Co. | 1353 |
| Devcon Corp. | 2004 |
| De Vlieg Microbore Div. | 1549 |
| Diamond Machine Tool Corp. | 620 |
| Eugene Dietzen Co., Inc. | 1735 |
| The DoAll Co. | 604 |
| Doerr Electric Corp. | 1335 |
| The Dow Chemical Co. | 1653 |
| Drillmatic Co. | 1371 |
| The du Mont Corp. | 139 |
| Durant Tool Supply Co. | 2025 |

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| Easco Products Div., Electro Arc Sales Co. | 1805 |
| Eastern Machine & Tool Co. | 431 |
| Eastman Kodak Co. | 208 |
| Eclipse Counterbore Co. | 344 |
| The Electromark Corp. | 1156 |
| Elox Corp. of Michigan | 935 |
| Enco Mfg. Co. | 504 |
| Engelberg Huller Co., Inc. | 1604 |
| Engis Equipment Co. | 218 |
| Equipto Div., Aurera Equipment Co. | 975 |
| Erickson Tool Co. | 805 |
| Errington Mechanical Laboratory | 1076 |
| ESBEC Barrel Finishing Corp. | 954 |
| Everite Machine Products Co. | 134 |

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| FAC Div. of Overseas Comm. | 1700 |
| Falcon Tool Co. | 213 |
| Fawick Airflex Div., The Fawick Corp. | 513 |
| The Fellows Gear Shaper Co. | 1820 |
| Ferguson Machine Corp. of Indiana | 605 |
| Fidelity Tool Supply | 1761 |
| Wm. H. Field Co., Inc. | 962 |
| Firth Sterling, Inc. | 202 |
| Fonda Gage Co., Inc. | 2119 |
| Foster Supplies Co. | 2001 |
| Furane Plastics, Inc. | 1072 |

G

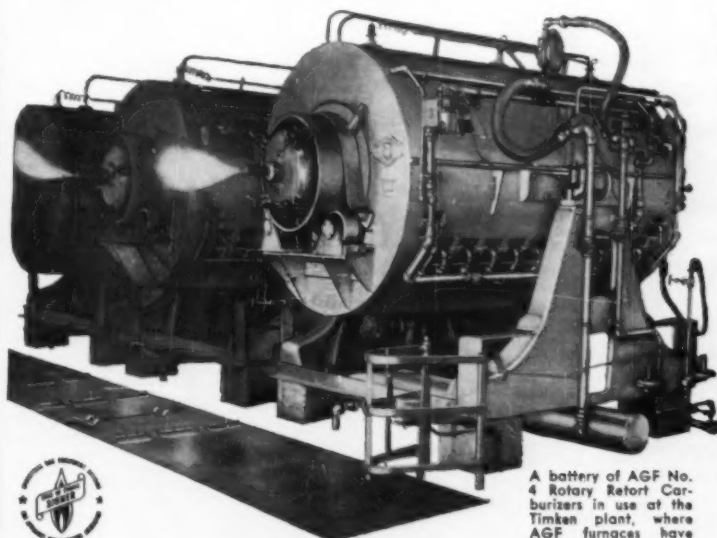
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| The Gaertner Scientific Corp. | 426 |
| The Gairing Tool Co. | 318 |
| Galland-Henning Mfg. Co. | 834 |
| The Gammons-Hoaglund Co. | 500 |
| Gardner-Denver Co. | 1930 |
| Gay-Lee Co. | 1919 |
| General Electric Co. | 1770 |
| James W. George Machinery Co. | 1456 |
| Russell T. Gilman, Inc. | 1016 |
| The Giustina Corp. of America | 2152 |
| Govro-Nelson Co. | 2145 |
| Graham Machine Tool Co. | 1721 |

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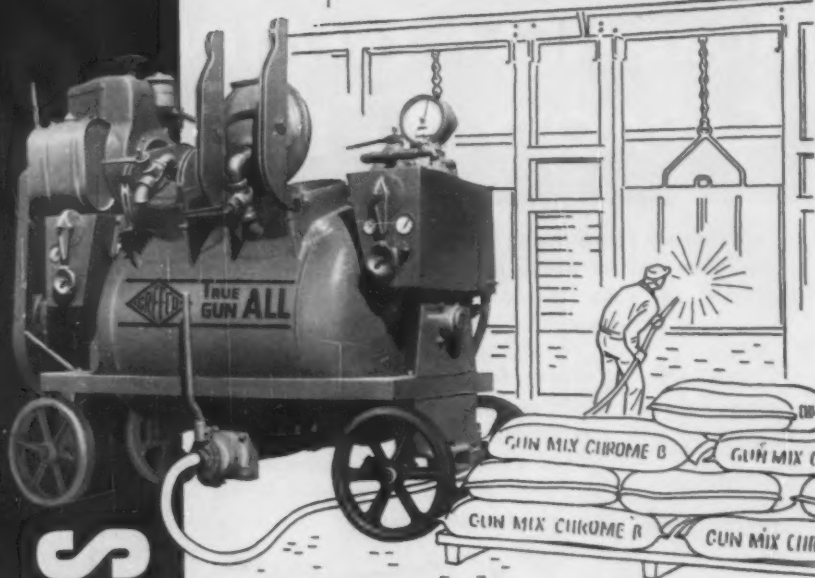
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Now offered as a revolutionary advance in the field of pneumatic refractories application, the GREFCO TRUE GUN-ALL is a *true* all-purpose refractory gun handling all types of bulk refractory products.

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CHROME GUN MIXES—for open hearth back walls

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In the GREFCO TRUE GUN-ALL, water is added to the refractory *in the mixer*. No guesswork on moisture content. Minimum of rebound loss. Handles complete range of materials—coarse or fine grind—very wet or extremely dry mixes—light weight or heavy aggregates. One machine for all applications.



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| Graymills Corp. | 1214 |
| Green Instrument Co., Inc. | 1065 |
| Greist Manufacturing Co. | 145 |
| Grob Inc. | 520 |
| Grobet File Co. of America, Inc. | 2121 |
| Gulf Oil Corp. | 313 |
| Guthery Machine Tool Corp. | 1204 |

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| Hamco Machines, Inc. | 2146 |
| Hamilton Watch Co., Allied Products Div. | 1925 |
| Hammond Machinery Builders, Inc. | 1704 |
| Handy & Harman | 244 |
| Hanna Engineering Works | 713 |
| Hansford Mfg. Corp. | 961 |
| Harco Engineering | 428 |
| Hartig Mfg. Corp. | 1027 |
| T. S. Harrison & Sons Ltd., England | 1456 |
| Hause Machines, Inc. | 1150 |
| Heinrich Tools Inc. | 1252 |
| Heller Tool Co. | 1020 |
| The Herman Stone Co. | 2046 |
| Hevi Duty Electric Co. | 205 |
| Hillyer Instrument Co., Inc. | 1701 |
| Hofmann Engineering Co. | 2042 |
| Hoglund Engineering & Mfg. Co., Tri-Ordinate Corp. | 1301 |
| Homestrand, Inc. | 729 |
| Hovis Screw Lock Co. | 1064 |
| Howe & Fant, Inc. | 1662 |
| Hudson Automatic Machine & Tool | 1055 |
| Humphrey Products Div., General Gas Light Co. | 1900 |
| C. B. Hunt & Son, Inc. | 529 |
| Huron Machine Products Inc. | 127 |

I

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| Ideal Industries, Inc. | 1650 |
| Illinite Div., Illinois Tool Works | 826 |
| Illinois Institute of Technology, Diamond Tool Technology Lab. | 1850 |
| Illinois Metal Products | 1168 |
| Index Machine Co. | 524 |
| Industrial Diamond Assn. of America | 1840 |
| Industrial Tectonics, Inc. | 427 |
| Ingersoll Milling Machine Co., Cutter Div. | 621 |
| Ingersoll-Rand Co. | 1639 |
| Inter-Lakes Engineering | 801 |
| International Research & Development Corp. | 209 |
| The Iron Age | 231 |

J

| | |
|-------------------------------|------|
| J & S Tool Co., Inc. | 1501 |
| The Jacobs Mfg. Co. | 1535 |
| Jarvis Corp. | 1417 |
| Jemco Tool Corp. | 1167 |
| Jeon Mfg. Co. | 2054 |
| Jergens Tool Specialty Co. | 1672 |
| Jersey Mfg. Co. | 2154 |
| Jiffy Disintegrators, Inc. | 2014 |
| Jiffy Mfg. Co. | 2055 |
| C. E. Johansson Gage Co. | 418 |
| The I. O. Johansson Co. | 1946 |
| The Johnson Gage Co. | 304 |
| O. S. Johnson & Co. | 2053 |
| Jones & Lamson Machine Co. | 1504 |
| Jones & Laughlin Steel Corp. | 1716 |
| Jones & Shipman (Canada) Ltd. | 914 |

K

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|--|------|
| Kalamazoo Tank & Silo Co., Machine Tool Div. | 525 |
| Karge-Turnomat Div., Taber Instrument Corp. | 1915 |
| Kennametal Inc. | 1605 |
| King Tester Corp. | 437 |
| Albert Klingelhoefer Mach. Tool Corp. | 1739 |
| Kopyy Tool & Die Co. | 915 |

L

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|---------------------------|-----|
| Lamina Dies & Tools, Inc. | 929 |
|---------------------------|-----|

This beautiful, new overpass erected at Winthrop, Maine has sidewalk railings made of Continuous Weld Yoloy Steel Pipe. Yoloy's extra strength and excellent corrosion-resistance are qualities required for applications of this type.

"Yoloy" pipe is on the job

... providing strong, corrosion-resistant bridge railings for Maine State Highway Commission

Maine chose Yoloy! It proved so easy to fabricate and weld that 2 additional Maine bridges will have Yoloy railings. This nickel-copper alloy steel also demonstrates added strength and longer life making it an ideal structural pipe!

Available in Sheets, Plates, Bars, Shapes, Cold Drawn Bars and Tubular Products, Youngstown's complete family of Yoloy steels provides the right grade for each of your specific jobs. Complete informative Data Sheets on each Yoloy steel will be sent you promptly upon request.



OVERPASS AT WINTHROP, MAINE ERECTED FOR THE BRIDGE DEPARTMENT OF MAINE STATE HIGHWAY COMMISSION. YOLOY PIPE WAS SOLD THROUGH JOBBER W. L. BLAKE CO., PORTLAND, MAINE, TO BANCROFT & MARTIN ROLLING MILLS CO., SOUTH PORTLAND, WHO FABRICATED THE BRIDGE RAILINGS. CIANCHETTI BROS. INC., PITTSFIELD, MAINE, ERECTED THE SECTIONS FOR GENERAL CONTRACTOR M. E. SARGENT, INC., STILLWATER, MAINE.



PHOTOS COURTESY OF MAINE STATE HIGHWAY COMMISSION

THE YOUNGSTOWN SHEET AND TUBE COMPANY
Manufacturers of Carbon, Alloy and Yoloy Steel
 General Offices - Youngstown 1, Ohio
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WRITE FOR THESE FREE PAMPHLETS IN THE YOLOY FAMILY SERIES:

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| YOLOY "E" | HIGH STRENGTH-LOW ALLOY STEEL-STANDARD APPLICATIONS |
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| YOLOY "C" | CORROSION RESISTANT GRADE FOR DEEP FORMING |
| YOLOY PIPE | CONTINUOUS WELD FOR CORROSION RESISTANT APPLICATIONS |

EXHIBITORS

| | |
|---|------|
| Landis Machine Co. | 1538 |
| Lapeer Mfg. Co. | 833 |
| Lassy Tool Co. | 1159 |
| Latrobe Steel Co. | 245 |
| Le Count Tool Works Inc. | 2002 |
| Lehmann-Fulton Boring Tool Co., Div. | |
| Fulton Iron Works Co. | 137 |
| Leland-Gifford Co. | 2105 |
| Link Aviation, Inc. | 444 |
| Littleford Bros. Inc. | 2120 |
| Livorno Engineering Co. | 923 |
| Lodding, Inc. | 112 |

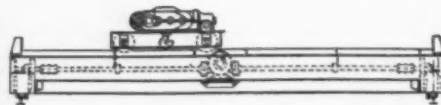
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|-----------------------------------|------|
| Logan Engineering Co. | 625 |
| Logansport Machine Co., Inc. | 1652 |
| Lovejoy Tool Co., Inc. | 1870 |
| The Lufkin Rule Co. | 1046 |

M

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|---|------|
| M-B Products Inc. | 1459 |
| Machine Tool Manufacturers Affiliates | 1311 |
| Mac-It Screw Div., Strong, Carlisle & Hammond | 404 |
| Madison-Faessler Co. | 1224 |
| Madison Industries, Inc. | 1224 |
| Madison-Relco Tool Co. | 1224 |
| Magnaflux Corp. | 102 |
| Malcus Tool Corp. | 2047 |
| Man-au-Cycle Corp. of America, S & S Machinery Co. | 1748 |
| Manex Machinery Corp. | 733 |



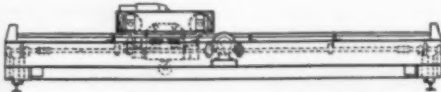
STANDARD HEADROOM
Provides highest hook height with top-running trolley and end mounted hoisting unit.



Model DTMD-TT



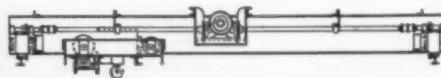
MEDIUM HEADROOM
Here the hoisting unit is rigidly suspended from the top-running trolley to reduce clearance over rail.



Model DTMD-LT



LOW HEADROOM
Under-running trolley permits unusually high hook lift. Use it where clearance under bridge must be maximum.



Model DTMD-UT



SUSPENDED TRACK
Operates on lower flange of crane runway suspended from roof guides or other overhead support. Use also where load transfer is desired.



Model DUMD-UT

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CRANEMASTER
for any building condition

Send For **BULLETIN C-108**

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| | |
|---|------|
| Marlette Corp. | 1950 |
| Martin Engineering Co. | 1361 |
| Maserati Corp. of America | 1320 |
| Master Chemical Corp. | 1329 |
| Master Mfg. Co. | 1316 |
| Master Pneumatic Tool Co. | 1271 |
| Jas. H. Matthews & Co. | 1324 |
| Mayline Co., Inc. | 1234 |
| McCrosky Tool Corp. | 949 |
| Mead Specialties Co. | 1302 |
| Metal Carbides Corp. | 740 |
| The Metal Removal Co. | 1305 |
| Metallurgical Products Dept., General Electric Co. | 1435 |
| Metlab Co. | 131 |
| Mettler Machine Tool, Inc. | 2142 |
| Micro-Line, Inc. | 138 |
| Micrometrical Mfg. Co. | 223 |
| Micro-Poise Engineering Sales | 114 |
| The Milford Rivet & Machine Co. | 1671 |
| Miller Fluid Power Co. | 1625 |
| Modern Devices Co. | 2108 |
| Modernair Corp. | 1158 |
| Mohawk Tools Inc. | 230 |
| Monroe Engineering Products | 132 |
| Moore Products Co. | 1375 |
| Moore Special Tool Co., Inc. | 1249 |
| The Robert E. Morris Co. | 501 |
| H. E. Morse Co. | 111 |
| The Match & Merryweather Machinery Co. | 720 |

N

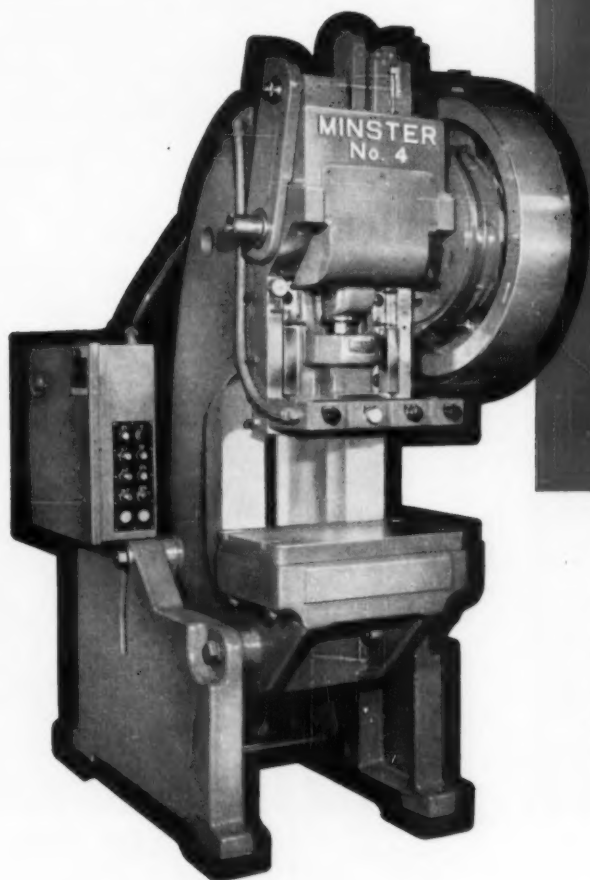
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|--------------------------------------|------|
| The National Acme Co. | 2115 |
| National Broach & Machine Co. | 922 |
| Karl A. Neise | 1857 |
| Nelco Tool Co., Inc. | 126 |
| New Hermes Engraving Machine | 964 |
| New York Belting & Packing Co. | 1824 |
| Newage Industries Inc. | 2104 |
| Nicholson File Co. | 406 |
| Nikon Inc. | 1061 |
| The A. H. Nilson Machine Co. | 1817 |
| The Noble & Westbrook Mfg. Co. | 837 |
| North American Viking Drill Co. | 2149 |
| Northwestern Tool & Engineering | 968 |
| Nupla Mfg. Co. | 844 |
| The Nylock Corp. | 643 |

O

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|---|------|
| The O. K. Tool Co., Inc. | 1047 |
| Oakite Products, Inc. | 641 |
| Oberg Mfg. Inc. | 1771 |
| Olivetti Corp. of America, Machine Tool Div. | 1612 |
| Tinius Olsen Testing Machine Co. | 1023 |
| O'Neil-Irwin Mfg. Co. | 821 |
| Optical Gaging Products, Inc. | 319 |
| Opto-Metric Tools, Inc. | 101 |
| Kurt Orban Co., Inc. | 1205 |
| Ortman-Miller Machine Co., Inc. | 612 |
| The Osborn Mfg. Co. | 1434 |
| O-Vee Gauge Co. | 2005 |
| Oxalid Div., General Aniline & Film Corp. | 2129 |

P

| | |
|---|------|
| Pacific Industrial Mfg. Co. | 1424 |
| Geo. C. Patterson Machine Co. | 1174 |
| Pedrick Tool & Machine Co. | 809 |
| Pegard (Societe Anonyme Ateliers Marcel Pegard), Belgium | 1348 |
| Penn Engineering & Mfg. Corp. | 1924 |
| Perry Equipment & Engineering Co. | 1414 |
| Petz-Emery Inc. | 435 |
| Pfauter Machine Co. | 1338 |
| P I C Design Corp. | 1906 |
| Pines Engineering Co. | 1317 |
| Pioneer Pump Div., Detroit Harvester Co. | 1657 |
| Portage Double Quick, Inc. | 1861 |
| Porter Precision Products | 1821 |
| Portman Instrument Co. | 434 |
| Portomac, Inc. | 919 |
| Precise Products Corp. | 1155 |



You Helped Design The Improved **MINSTER O.B.I.**

You, as a press user, have often told us what features you wanted in an O.B.I. to improve your press operations. Most of the design changes in this improved Minster O.B.I. are based on your ideas, desires and demands.

CENTRALIZED CONTROL CABINET CONVENIENTLY LOCATED . . . NEVER INCLINES

For convenience and better operation, control cabinet mounted on leg remains vertical when press is inclined; is subject to less operational shock and easier to maintain.

NEW LEG DESIGN PROVIDES MORE WORKING SPACE

Square-cut legs give operator more room, a comfortable position in front of press. Inclining mechanism in leg and use of movable spacer rod provide more free space under press for tote pans or conveyors.

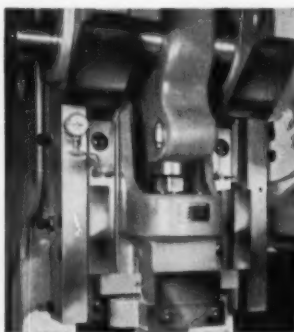
| NUMBER | 4 | 5 | 6 |
|---------------|----|----|----|
| TONS CAPACITY | 32 | 45 | 60 |

Flywheel or geared type. Drive can be mounted on either side. MINSTER patented Combination Air Friction Clutch and Brake Unit mounted within flywheel or drive gear on crankshaft.



HEAVIER FRAME FOR GREATER RIGIDITY, ACCURACY AND DIE LIFE

Frame closed in on top and front completely encloses bearing caps, thus providing better distribution of work forces. Connection cover keeps press cleaner—no oil drops hit operator.



GREATER CONNECTION STRENGTH — IMPROVED KNOCKOUT

Tail stock type connection screw locking. Increased connection strength and screw support.

T-Slotted Knockout blocks moving against frame surface give more positive knockout, are easier to adjust. No more bracket breakage.



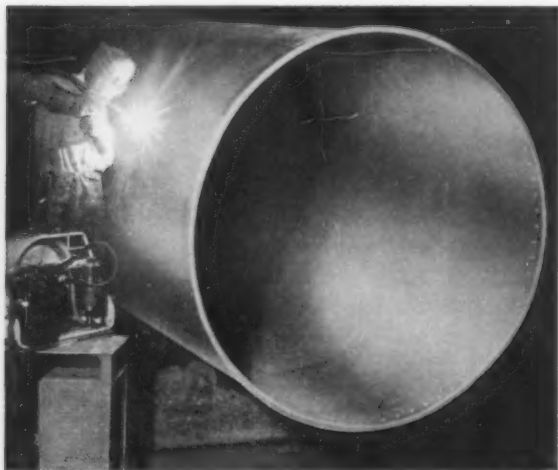
FASTER, EASIER INCLINING

Inclining the press takes less time and labor with ratchet-wrench-operated mechanism located in press leg at normal working height. Die changes are made quickly in vertical position with greater safety, more accurate alignment and less die change-over time.

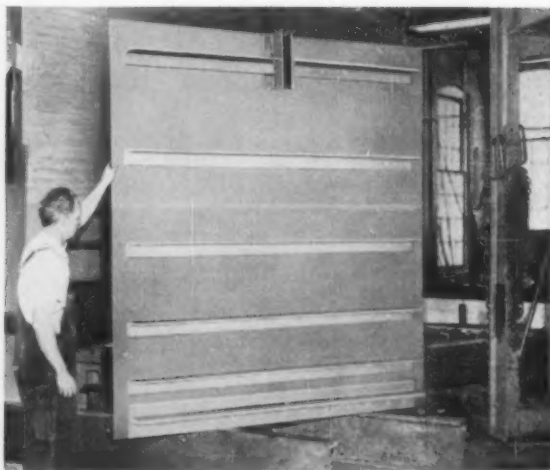
THE MINSTER MACHINE COMPANY • MINSTER, OHIO

CUT CORROSION LOSSES

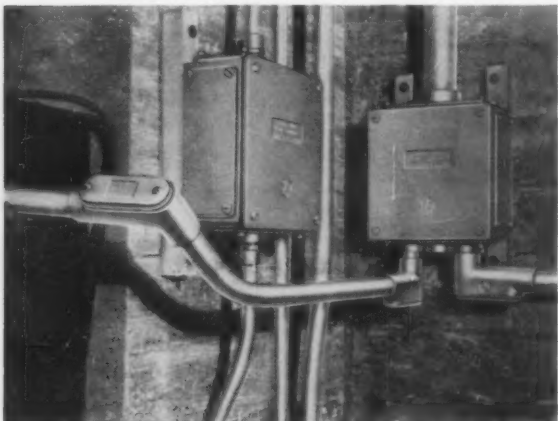
Get unusual corrosion resistance, plus high strength, toughness, weldability, and easy fabrication with Everdur,[®] Anaconda copper-silicon alloys



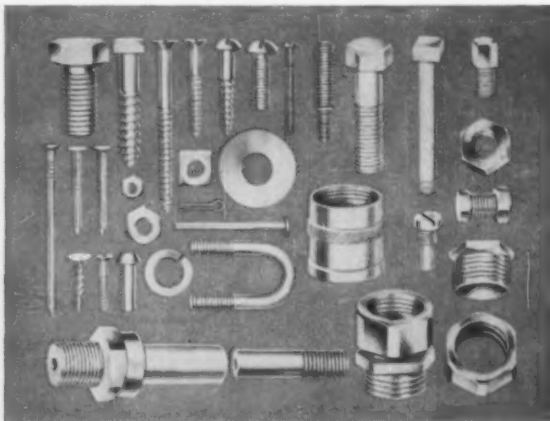
TANKS AND INDUSTRIAL EQUIPMENT requiring a combination of high strength, toughness and resistance to corrosion. Hot water storage heaters and tanks, unfired pressure vessels of Everdur are readily fabricated by welding.



IN WATER AND WASTE SYSTEMS, Everdur alloys provide easy fabrication and long service in a wide variety of jobs—from gates on to bolts and nuts. Their high strength makes possible lightweight, built-up assemblies of wrought metal.



ELECTRICAL CONDUIT of Everdur protects electric lines in corrosive environments, withstands vibration and abrasion—at oil refineries, in underwater tunnels (above), chemical plants. Made in two wall thicknesses—R. C. and E. M. T.



FASTENINGS AND SCREW MACHINE PARTS. Everdur is available in forms for hot heading and forging of bolts and accessories, severe cold-working operations for bolts and screws—and as free-cutting rod for screw machine products.

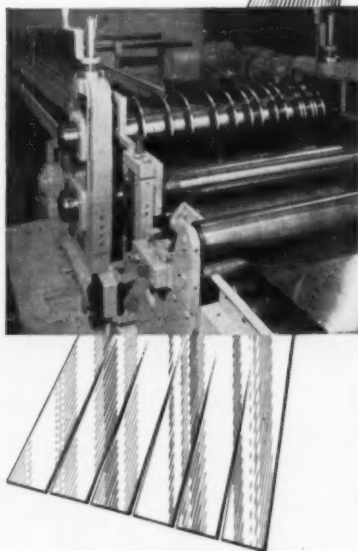
Whenever you have a tough problem calling for high strength with immunity to rust, and corrosion resistance equivalent to pure copper, consider an Everdur alloy. It may save you a lot of trouble and money. For details on properties and applications of Everdur alloys, write for Publication E-5. Address: The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont. 6544

EVERDUR
COPPER-SILICON ALLOYS
products of

ANACONDA[®]

Made by The American Brass Company

**from cold strip
to slit strands
IN SECONDS**



YODER ROTARY MULTIPLE SLITTERS

A Yoder slitter converts mill-width coils of flat-rolled metal into many variable-width strands in amazingly short time. Speed, coupled with great accuracy and low manpower requirements, makes a Yoder slitter an important factor in keeping production and overhead costs down.

Operated by only two men, the Yoder Type 3-48 slitter illustrated is designed to accommodate standard mill-width coils up to 48 inches wide, in a variety of metals and thicknesses. The slit strand widths can be held to within a .004" tolerance.

Even if your steel requirements are as little as 100 tons a month, the savings to be realized in time, manpower and raw material costs alone will pay for a Yoder slitter in the first few months of operation.

There is a Yoder slitter designed and engineered to meet your requirements, and to speed the delivery of "special" width stock in a wide range of large or small sizes. Send for your free copy of the fully-illustrated, 76-page booklet, "Multiple Rotary Slitting Lines."

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| | |
|--|------|
| Precision Detroit Co. | 1248 |
| Precision Tool & Mfg. Co. | 129 |
| Press Automation Systems Inc. | 1256 |
| Press Divisions, Henry & Wright, V & O Press, Emhart Mfg. Co. | 721 |
| Procurier Safety Chuck Co. | 1725 |
| Production Devices Inc. | 1363 |
| Production Machine Co. | 1811 |
| The Producto Machine Co. | 1500 |
| Punch Products Corp. | 1323 |

R

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|---|------|
| R & L Tools | 830 |
| Rahn Granite Surface Plate Co. | 403 |
| Reichhold Chemicals, Inc. | 2034 |
| Retor Developments Ltd. | 2018 |
| Richard Brothers Punch Div., Allied Products Corp. | 1548 |
| J. A. Richards Co. | 1834 |
| William Riggs Co. | 2007 |
| Omer E. Robbins Co. | 1661 |
| Robinson Aviation Inc. | 841 |
| Ross Operating Valve Co. | 814 |
| The Rotor Tool Co. | 1832 |
| H. B. Rouse & Co. | 1152 |
| Rowe Machinery & Mfg. Co. | 800 |
| Royal Master Inc. | 1953 |
| Royal Oak Tool & Machine Co. | 519 |
| Russell, Holbrook & Henderson | 1570 |
| Joseph T. Ryerson & Son, Inc. | 1036 |

S

| | |
|---|------|
| Sales Service Machine Tool Co. | 2035 |
| Sandex Automation Inc. | 1934 |
| Sandvik Steel, Inc. | 2118 |
| Scharmann Machine Corp. | 1015 |
| Schauer Mfg. Corp. | 1177 |
| George Scherr Co., Inc. | 445 |
| A. Schrader's Son Div., Scovill Mfg. Co. | 1634 |
| Schramm, Inc. | 1237 |
| Scott Paper Co. | 1935 |
| Scully-Jones and Co. | 1635 |
| Sealor Corp. | 130 |
| Seewald, Inc. | 1534 |
| Edward Segal Machinery | 539 |
| Seibert Sons, Inc. | 909 |
| Selas Corp. of America | 1344 |
| The Sentry Co. | 436 |
| Service Diamond Tool Co. | 1059 |
| Service Machine Co. | 1345 |
| Severance Tool Industries, Inc. | 235 |
| The Sheffield Corp. | 222 |
| Sheldon Machine Co., Inc. | 724 |
| Sheridan Advertising Specialties | 960 |
| Sierra Machine Co. | 2100 |
| Siewek Tool Co. | 408 |
| Simonds Abrasive Co. and Simonds Saw and Steel Co. | 312 |
| Size Control Co., Div. American Gage & Machine Co. | 405 |
| The Skinner Chuck Co. | 1448 |
| Allen J. Smith & Associates | 133 |
| Socony Mobil Oil Co., Inc. | 1339 |
| Spiral Step Tool Co. | 1475 |
| Spitfire Tool Co. | 1638 |
| Henry A. Spittler, Inc. | 1904 |
| The Standard Electrical Tool Co. | 946 |
| Standard Parts Co. | 1173 |
| Standard Pressed Steel Co. | 322 |
| Stanley Sheppard | 1470 |
| Starlite Industries, Inc. | 1069 |
| The L. S. Starrett Co. | 1401 |
| The Steco Corp. | 2138 |
| Stewart-Warner Corp. | 544 |
| Edwin B. Stimpson Co., Inc. | 303 |
| Stone Machinery Co., Inc. | 545 |
| Stupakoff Div. of The Carborundum Co. | 709 |
| Suburban Machine Co. | 917 |
| Sun Oil Co. | 640 |
| Sunnen Products Co. | 1438 |
| Super-Cut, Inc. | 1849 |
| Superior Hone Corp. | 1670 |
| Superior Pneumatic & Mfg. Co. | 1929 |
| Superior Steel Products Corp. | 505 |

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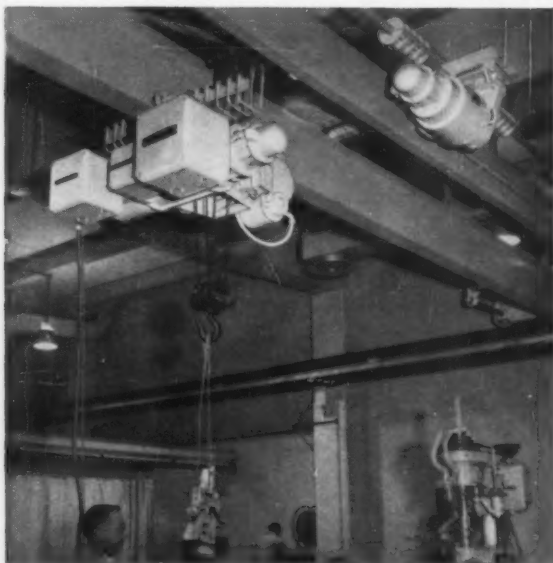
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PRODUCTION
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CASTINGS**

**ONE OF THE
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ESTABLISHED 1866
**THE WHELAND
COMPANY**
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SHEPARD NILES HOISTS

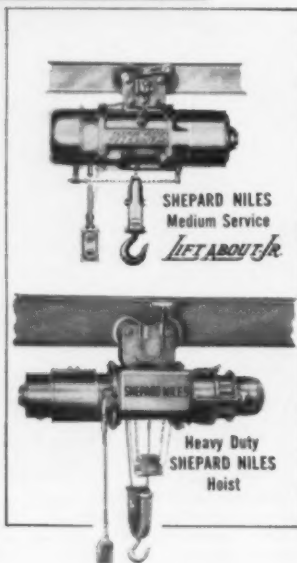
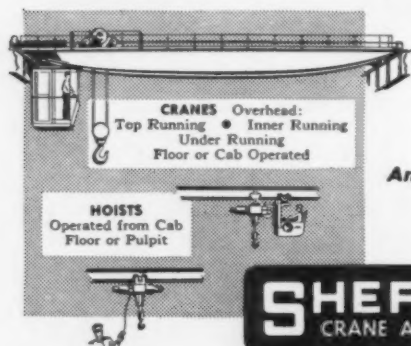
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EXHIBITORS

| | |
|----------------------------|------|
| Supreme Products Corp. | 734 |
| Swanson-Erie Corp. | 1575 |
| Swedish Crucible Steel Co. | 1068 |
| Sykes Tool Corp. Ltd. | 741 |
| Syntro Co. | 2147 |

T

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|-------------------------------------|------|
| The Taft-Peirce Mfg. Co. | 219 |
| Tapmatic Corp. | 969 |
| Taylor Devices, Inc. | 958 |
| Taylor Dynamometer & Mach. Co. | 430 |
| Techni-Tool Products, Inc. | 1955 |
| Techno Products Corp. | 2136 |
| The Texas Co. | 2019 |
| Thor Power Tool Co. | 1845 |
| Thread-All Sales Co. | 1060 |
| Tocco Div., The Ohio Crankshaft Co. | 1304 |
| Tomco, Inc. | 744 |
| The Tomkins-Johnson Co. | 1423 |
| Toritt Mfg. Co. | 1349 |
| Tork-Mor, Inc. | 335 |
| The Torrington Co. | 1216 |
| Transmares Corp. | 617 |
| True-Trace Sales Corp. | 2135 |
| Tubular Micrometer Co. | 445 |
| Tubular Rivet & Stud Co. | 1717 |
| Twentieth Century Mfg. Co. | 2114 |

U

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|---|------|
| Uddeholm Co. of America | 330 |
| Union Mfg. Co. | 422 |
| U. S.-Burke Machine Tool Div. | 1261 |
| U. S. Tool Co., Inc. | 1554 |
| United States Gypsum Co. | 2015 |
| United States Rubber, Mechanical Goods Div. | 1233 |
| United Tool Co. | 1220 |
| Universal Mfg. Co., Inc. | 1905 |
| Upton Bradeen & James Ltd. | 1534 |

V

| | |
|---|------|
| Vaill Engineering Co. | 508 |
| Valenite Metals Div., Valeron Corp. | 644 |
| Valvair Corp. | |
| Sinclair Collins Valve Co. | 540 |
| Vanadium-Alloys Steel Co. | 533 |
| Vanguard Engineering Co. | 1063 |
| The Van Keuren Co. | 419 |
| Vascoloy-Ramet Corp. | 1035 |
| Veet Industries | 1262 |
| Vernon Devices | 1909 |
| Victor Adding Machine Co., McCaskey Industrial Div. | 732 |
| Vlier Engineering, Inc. | 957 |

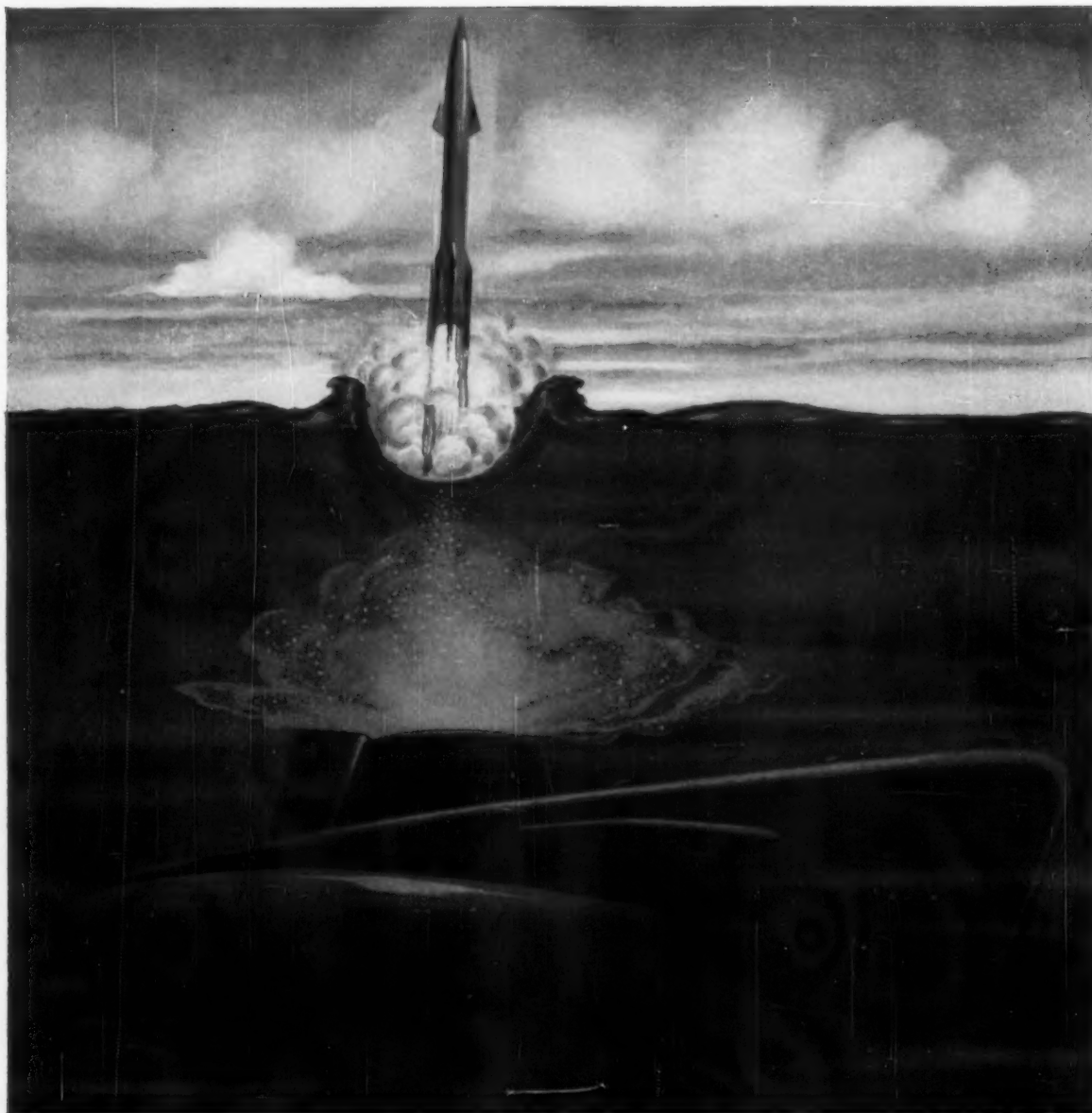
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| The Vulcan Tool Co. | 1404 |
|---------------------|------|

W

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|---|------|
| E. H. Wachs Co. | 1210 |
| Wadell Equipment Co. | 1816 |
| Wales-Strippit Co. | 1622 |
| O. S. Walker Co., Inc. | 1947 |
| Warner & Swasey Research Corp. | 1756 |
| Watts Regulator Co. | 967 |
| Webber Gage Co. | 302 |
| Weisser Machinery Corp. | 1028 |
| Wells Mfg. Corp. | 1713 |
| Wesson Co. | 1516 |
| West Point Mfg. Co. | 1757 |
| Westwood Machine Tools Canada, Ltd. | 1948 |
| S. B. Whistler & Sons, Inc. | 1525 |
| The Whiton Machine Co. | 1163 |
| The Wickman Mfg. Co. | 1405 |
| J. H. Williams Co. | 2009 |
| Wilson-Carr, Inc. | 1908 |
| Wilson Mechanical Instrument Div., American Chain & Cable Co., Inc. | 309 |
| Wintriss, Inc. | 1921 |
| Wisconsin Drill Head Co. | 1760 |
| N. A. Woodworth Co. | 412 |

Z

| | |
|-------------|------|
| Zagar, Inc. | 1738 |
| Carl Zeiss | 438 |



Underwater weapon . . . with wings!

A major American weapon is shaping up in the U.S. Navy. It's the *Polaris*—a new guided-missile system designed for underwater firing from a nuclear-powered submarine. These mobile, elusive launching sites make defense against *Polaris* practically impossible.

The heart of this deadly weapon is a complex guidance and fire-control system, now under joint development by the Navy and private industry. Without rugged, reliable electrical insulations, such as those CDF supplies, these intricate electronic controls simply wouldn't work.

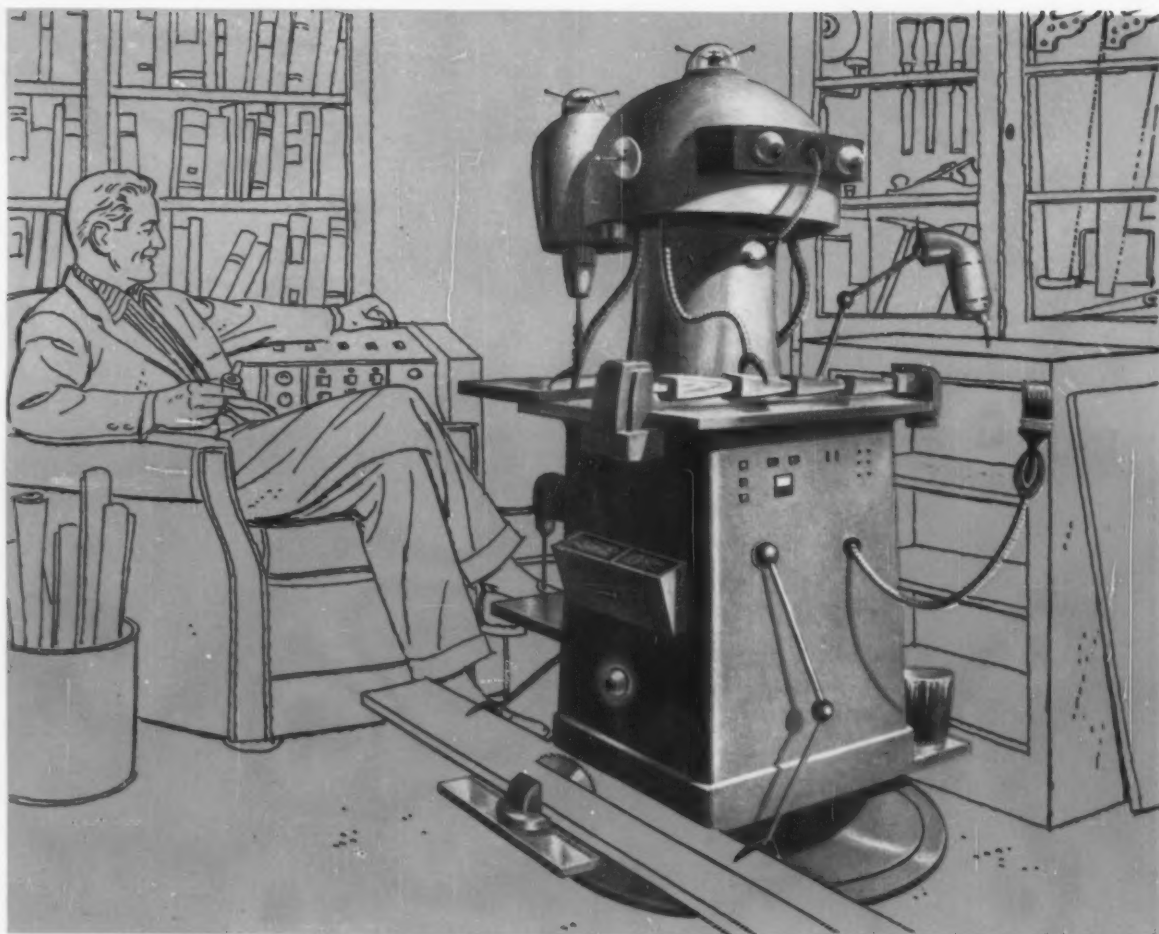
CDF, a subsidiary of The Budd Company, has pioneered dependable electrical insulations for over sixty years. You'll find CDF products almost everywhere—in the aircraft, automotive, communications, and railway fields, to name a few.

Have you a "problem product"—one that CDF insulation could improve? See Sweet's Product Design File and other directories for the name and phone number of your CDF sales engineer. Send your print or your problem; we'll return pertinent technical literature and recommendations.



CONTINENTAL-DIAMOND FIBRE

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No matter what you make from Cold Rolled Steel **An ALAN WOOD Representative can help!**

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provide you with the latest information on cold rolled steel and its application, plus experienced advice on the gauge, size and type to order. Call him today. Your A.W. Representative is always available...never out of touch with your location.

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| | |
|---|---|
| IRON PRODUCTS "Swede" pig iron | A.W. CUT NAILS Standard & Hardened |
| STEEL PRODUCTS Plates (sheared) A.W. Dynalloy (high strength steel) Hot rolled sheets Hot rolled strip Cold rolled sheets Cold rolled strip | MINE PRODUCTS Iron ore concentrates Iron powder Crushed stone Sand |
| ROLLED STEEL FLOOR PLATE A.W. ALGRIP abrasive A.W. SUPER- DIAMOND pattern | COKE Foundry, industrial & metallurgical |
| COAL CHEMICALS | PENCO METAL PRODUCTS DIVISION Steel cabinets, lockers & shelving |



The Iron Age Summary

'58 Output Set at 90 Million Tons

Estimated '58 production represents a 20 pct drop from '57 output.

Some mills register mild optimism after noting slight pickup in April orders.

■ Steel output this year is expected to drop some 20 pct below last year's production, and about 23 pct from the record output of 1955.

Steel men estimate that 1958 production will be in a range of 88 to 90 million ingot tons. This is quite a comedown from last year's 112.7 million tons, and a far cry from the record of 117 million tons set in 1955. Furthermore, it's less than 64 pct of the industry's 140.7 million ingot ton capacity.

Mild Optimism—Industry sales executives are mildly optimistic this week on the basis of orders received in April. The month started slow, but gained momentum. It now looks as though April, with one less day, might top March in shipments.

"The market has a little better tone," asserts one sales executive. "We're more optimistic."

Says another: "Nobody's talking about it. We're afraid of putting a hex on the streak."

Mills Warn Buyers—The mills' biggest problem is still inventory cutbacks. Steel users apparently are still content to live largely off their inventories. And this is tending to offset any seasonal gains in demand.

On inventories, steel men are raising the flag of caution to their customers. The warning: Don't overdo it. The mills are pointing out that they can't raise or lower their finished steel output by just turning a valve. What they mean is that a substantial pickup in orders will be reflected quickly in a lengthening of delivery schedules. Some steel users were caught short following the 1954 inventory retrenchment.

Non-Automotive Pickup — The steel market would be considerably brighter had the auto industry

not pulled the rug. Latest reports from Detroit indicate the automakers will be buying only limited tonnages until they start making new models in the third and fourth quarters of the year.

Users other than automotive are showing some signs of life. One mill reports its shipments to nearby customers during March were up 25 pct over the January-February level. Structural fabricators are said to be particularly active.

Business Appraisal—Some top-flight steel men believe that the business recession has passed its low point. They look for increased demand to stem from a pickup in construction, farming, canning, housing, and appliances. They expect automobile sales and production to perk up in the last quarter.

Although steel inventories have been cut considerably from their April 1957 peak, it's expected that they will still be a problem to the mills through the second and third quarters.

Steel Output, Operating Rates

| Production | This Week | Last Week | Month Ago | Year Ago |
|-------------------------|-----------|-----------|-----------|----------|
| (Net tons, 000 omitted) | 1,265 | 1,285 | 1,425 | 2,317 |
| Ingot Index | | | | |
| (1947-1949=100) | 78.7 | 80.0 | 88.7 | 144.2 |
| Operating Rates | | | | |
| Chicago | 55.5 | 54.0* | 56.5 | 86.0 |
| Pittsburgh | 46.5 | 49.0* | 57.0 | 93.0 |
| Philadelphia | 59.0 | 54.0 | 57.0 | 104.5 |
| Valley | 35.5 | 34.0* | 40.0 | 90.0 |
| West | 70.5 | 68.0 | 65.0 | 101.5 |
| Cleveland | 27.0 | 25.5* | 47.0 | 86.0 |
| Buffalo | 37.0 | 39.0 | 37.0 | 97.5 |
| Detroit | 13.0 | 12.0* | 28.0 | 97.0 |
| South | 54.0 | 54.5 | 47.5 | 95.5 |
| South Ohio River | 29.0 | 48.0* | 55.0 | 59.5 |
| Upper Ohio River | 58.0 | 64.0* | 76.0 | 95.0 |
| St. Louis | 56.0 | 55.0* | 70.0 | 93.0 |
| Northeast | 31.0 | 31.0 | 31.0 | 64.0 |
| Aggregate | | 47.6 | 50.6 | 90.5 |

*Revised

Prices At a Glance

(cents per lb unless otherwise noted)

| | This Week | Week Ago | Month Ago | Year Ago |
|------------------------------|-----------|----------|-----------|----------|
| Composite price | | | | |
| Finished Steel, base | 5.967 | 5.967 | 5.967 | 5.670 |
| Pig Iron (Gross ton) | \$66.49 | \$66.49 | \$66.49 | \$64.56 |
| Scrap, No. 1 hvy (Gross Ton) | \$31.83 | \$32.83 | \$35.00 | \$42.17 |
| No. 2 bundles | \$23.17 | \$24.17 | \$26.17 | \$34.50 |
| Nonferrous | | | | |
| Aluminum ingot | 26.10 | 26.10 | 28.10 | 27.10 |
| Copper, electrolytic | 25.00 | 25.00 | 25.00 | 32.00 |
| Lead, St. Louis | 11.80 | 11.80 | 12.80 | 15.80 |
| Magnesium ingot | 36.00 | 36.00 | 36.00 | 36.00 |
| Nickel, electrolytic | 74.00 | 74.00 | 74.00 | 74.00 |
| Tin, Straits, N. Y. | 93.00 | 92.50* | 93.875 | 99.625 |
| Zinc, E. St. Louis | 10.00 | 10.00 | 10.00 | 13.50 |

Plating: A Swing to Automation

The recession has slowed the growing use of more fully automated plating units.

But manufacturers believe the downturn is only temporary. They look for better business in late '58.

■ The trend to more automation in plating equipment continues. Manufacturers are urging platers to replace present equipment with newer, more automatic units. They point out the cost savings possible with more modern equipment.

However, the current recession has slowed down the swing to more automated lines. Customers, while probably convinced of the benefits, are hanging back. The urge to modernize is often checked by a hesitancy to spend money.

Quiet Summer Ahead—The same situation exists for semi-automatic equipment. Platers who might have switched from manual to semi-automatic units have also adopted a wait-and-see attitude.

Equipment builders believe it's only a matter of time until automated lines recover their former sales appeal. The trend existed before the recession began and can be expected to return in full force when conditions improve.

Meanwhile, plating equipment makers are resigned to a quiet summer. They expect low demand for the next six months, don't foresee any upturn until the last quarter.

Backlogs Dropping — Backlogs have been slipping and will probably keep going down hill in the second quarter. By summer they should be well below 1957 levels. The

slump actually began in the final quarter of last year. In the first quarter of '58 it deepened, with order volume well below year ago levels.

Limited automotive business has recently stimulated the market to a degree. But activity from Detroit traditionally slows down in the second and third quarters.

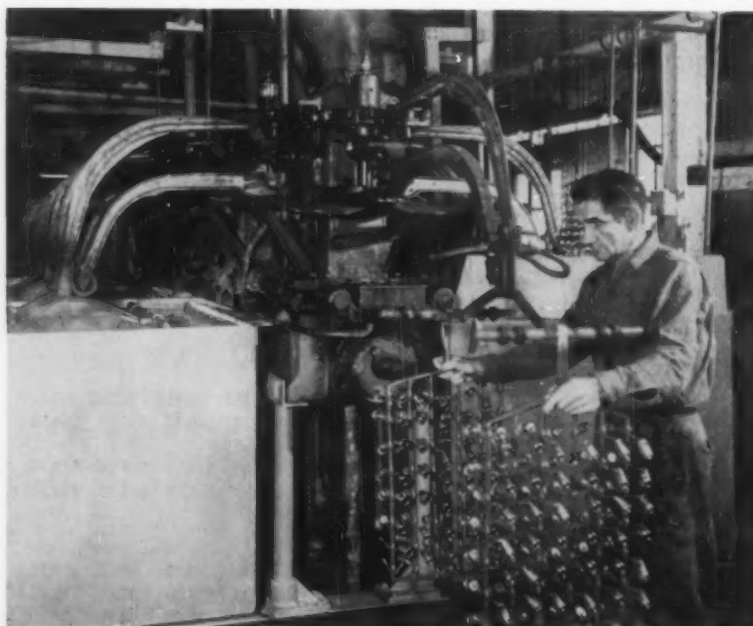
While not the only factor, poor auto sales are a major reason for sluggish plating equipment business.

Anodizing Gains — Anodizing equipment has been running counter to the general sales trend for plating machines. Thanks to buying by automakers and producers of architectural products it's above the level of other plating equipment. Plate equipment makers expect the use of anodized aluminum in autos will grow steadily. They believe chrome for cars probably reached its zenith in '58 and '59 models, should dwindle sharply in the 1960 models.

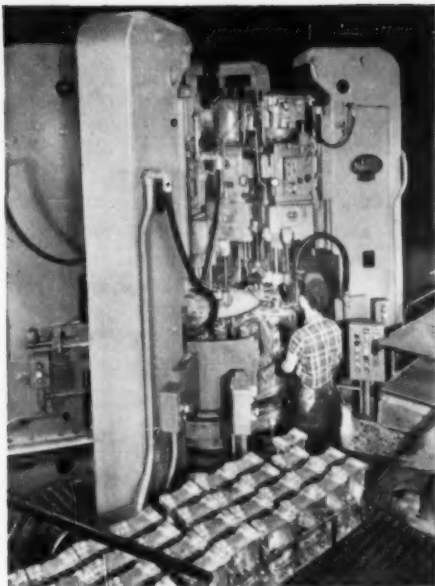
The plating equipment market now belongs to the buyer. The price outlook is steady, with manufacturers continuing to absorb cost increases. Their labor costs have gone up considerably, while raw material prices have generally held firm.

Design Stressed—Delivery time for plating equipment now covers only the actual engineering and fabricating periods. It usually runs about three or four months with installation requiring approximately another two months.

Hot competition and poor demand are causing manufacturers to put heavy emphasis on product development. Process developers are competing to get better corrosion resistance, better leveling (reducing need for buffing after plating), and brighter plating.

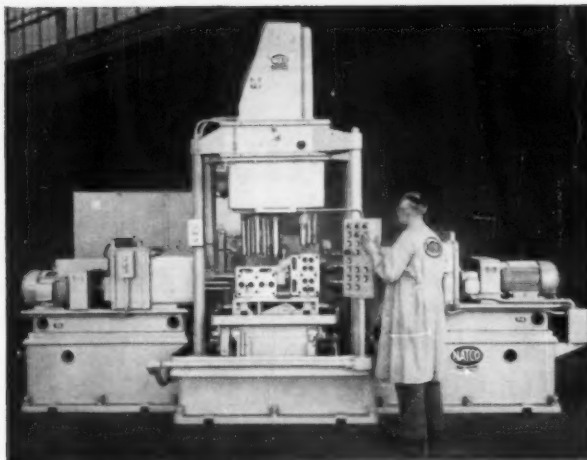
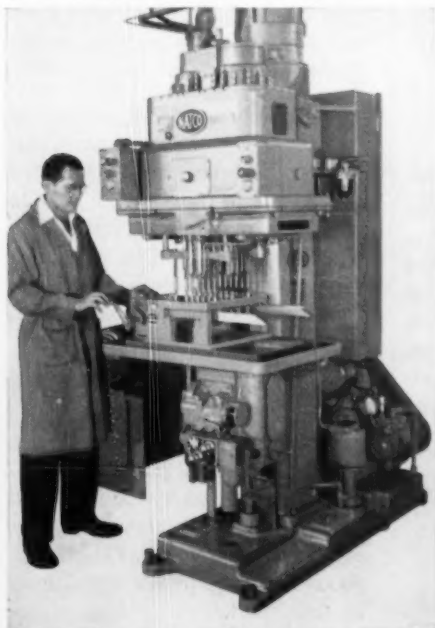


GROWING TREND: More platers are turning to fully automatic units such as this plating machine in operation at Casco Products, Bridgeport, Conn. Equipment was built by Frederic B. Stevens, Inc., Detroit.



Index Machine produces 400 cylinder blocks per hour. Operations on eleven holes include drilling, chamfering, reaming, counterboring and bur-nishing. Job No. BS-1.

New Multiple Spindle machine drills and taps simultaneously. Half the 16 or 24 spindles are driven electrically for drilling—the other half are driven by a hydraulic tapping motor. Suitable for production of 400 or more parts per hour or for general purpose use. Job No. 8672.



Four-way tapping machine uses 36 lead-screw spindles to process 30 diesel cylinder heads per hour. Four-position fixture holds two parts. Job No. 3719.

Somewhere in Natco's Experience is a Money-Saving Idea for You.

Only Natco builds *all* six types of production drilling equipment. As a result, we're not "married" to a particular approach. We can recommend the one that is best for you, give you the most production for your money. Tell us about your jobs. Somewhere in our experience is a money-saving idea for you! Send for our Production-Photo Folders on the jobs shown here.

Drilling, boring, facing, tapping.

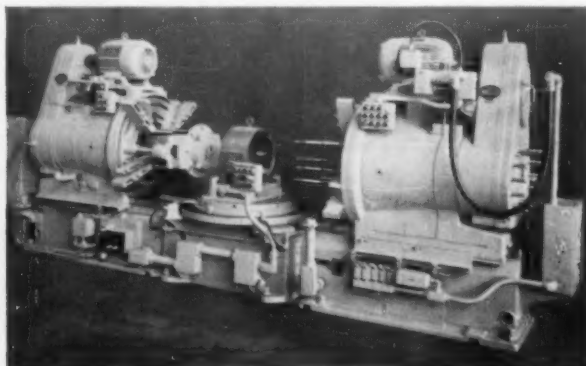
Only Natco Builds all Six

Standard multiple spindles, Way-type, Trunnion, Station, Index and Transfer Machines.



NATIONAL AUTOMATIC TOOL COMPANY, INC.
Richmond, Indiana

Two-way Natco drills and taps a variety of motor frames and brackets. Four-position index table holds either part. Left hand head drills only and is equipped for step drilling. Right hand head drills and taps. Both are adjustable for bolt circles up to 24 1/8" diameter. Job No. 3724.



What Buyer Patterns Tell About Market

Sellers hunt evidence that users are ready to step up the order pace.

Tonnages still placed in spurts, making scheduling headaches for mills.

■ User buying habits are getting lots of attention from steel producers. The mills are looking for clues that short-term ordering may be ending. So far the evidence is all negative. But here's what the buying patterns do show:

Customers are delaying orders as long as possible, dealing with only one month's needs at a time. The result: Each month the mills get enough tonnage on the books for two good weeks of production. Then they juggle rollings to keep mills operating until the next order wave arrives.

Buyers are shopping around be-

fore placing orders. Inquiries are plentiful, the mills say, but orders are often scarce.

Buy Now or Later?—There's a temptation for users to lay up steel stocks against prospect of steel price hikes, but it's likely to be resisted. Steel users are apparently doing some mental bookkeeping. They're trying to balance the gains in price savings now against the cost of carrying extra inventory that may not be used until fall.

Inventory cutting is still potent. Midwest warehouses, for example, had decided in March to suspend stock piling in the second quarter. Now, however, they've changed plans again and will allow inventories to drift downward at least through May.

Imports—Foreign mills still nibble away at the domestic market for rod and wire products. Overseas mills are even shipping rein-

forcing rod into the **Midwest** by rail. They are expected to switch to boats as soon as the shipping season opens on the Great Lakes.

Speaking at Cleveland, U. S. Steel Board Chairman Roger Blough pointed out that more imported barbed wire was sold in the U. S. last year than domestic. Jobbers at Cleveland, he added, can get barbed wire from Germany at \$40 under the price of USS mills right in the area. Blough also noted that Japanese producers buy scrap on the West Coast, make it into re-bars in Japan, and sell them back in California for \$29 a ton below domestic prices.

Sheet and Strip—Orders for May are coming in very slowly. Unless the pace improves the month could be worse than April for some producers. Most of the tonnage ordered during April will be shipped by the end of the month. Some areas report a little more life in the market. A pickup in sheet orders is noted by **Pittsburgh** producers.

In the **Midwest**, however, mills are operating at about 9 turns a week. Only galvanized sheet and tinplate are showing any strength.

Plate—Mill operations continue at reduced levels, in some cases only 50 pct of capacity, as users dig into inventories. Buyers are shopping around among producers, making a lot of inquiries before placing any orders.

Structurals — More buying by fabricators is helping the market for shapes. **Midwest** mills say April shipments will top those for March. And that month was better than February. Sales of light structurals are brisk in the **Chicago** area, with warehouses doing a good volume.

Pipe and Tubing — Spring construction revival has aided sale of standard pipe. As a result, mills are able to improve on March bookings. One large **Eastern** producer had booked by the first week in April as much tonnage as was sold all during March. Oil country goods and linepipe are not sharing in this spurt.

Delivery Promises at a Glance

| | Pittsburgh | Chicago | Cleveland | Detroit | East | West Coast |
|--------------------|------------|---------|-----------|---------|---------|------------|
| CR Carbon Sheet | 2-4 wks | 1-4 wks | 2-4 wks | 1-4 wks | 3-5 wks | 4 wks |
| HR Carbon Sheet | 1-2 wks | 1-2 wks | 1-3 wks | 1-3 wks | 2-3 wks | 3-4 wks |
| CR Carbon Strip | 2-4 wks | 1-4 wks | 2-4 wks | 1-4 wks | 3-5 wks | 4 wks |
| HR Carbon Strip | 1-2 wks | 1-2 wks | 1-3 wks | 1-3 wks | 2-3 wks | 3-4 wks |
| HR Carbon Bars | 1-2 wks | 1-2 wks | 2 wks | 1-2 wks | 2-4 wks | 2-4 wks |
| CF Carbon Bars | 1-4 wks | 1-3 wks | 1 wk | 1-2 wks | 1-3 wks | 1-2 wks |
| Heavy Plate | 1-2 wks | 1-4 wks | | | 3-5 wks | 4-6 wks |
| Light Plate | 1-2 wks | 1-2 wks | 1-3 wks | | 2-3 wks | 4-6 wks |
| Merchant Wire | 1 wk | 1 wk | 1 wk | | Stock | 3-4 wks |
| Oil Country Goods | 1-3 wks | 1-2 wks | 2-3 wks | | Stock | |
| Linepipe | 1-8 wks | 1-4 wks | 3-6 wks | | 2-4 wks | 4-6 wks |
| Buttweld Pipe | 1 wk | 1 wk | 1 wk | 1 wk | Stock | 2-4 wks |
| Std. Structurals | 1-4 wks | 1-3 wks | | 1-4 wks | 1-6 wks | 4-6 wks |
| CR Stainless Sheet | 2-4 wks | | 1-2 wks | 1-2 wks | 1-2 wks | |
| CR Stainless Strip | 2-3 wks | | 1-2 wks | 1-2 wks | 1-2 wks | |

COMPARISON OF PRICES

(Effective April 22, 1958)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price advances over previous week are printed in Heavy Type; declines appear in *Italics*.

| | Apr. 22 1958 | Apr. 15 1958 | Mar. 25 1958 | Apr. 23 1957 |
|--|-----------------|-----------------|-----------------|-----------------|
| Flat-Rolled Steel: (per pound) | | | | |
| Hot-rolled sheets | 4.925¢ | 4.925¢ | 4.925¢ | 4.675¢ |
| Cold-rolled sheets | 6.85 | 6.85 | 6.05 | 5.75 |
| Galvanized sheets (10 ga.) | 6.60 | 6.60 | 6.60 | 6.30 |
| Cold-rolled strip | 4.925 | 4.925 | 4.925 | 4.675 |
| Plate | 7.17 | 7.17 | 7.17 | 6.870 |
| Plates, wrought iron | 13.15 | 13.15 | 13.15 | 10.40 |
| Stainl's C-R strip (No. 302) | 52.00 | 52.00 | 52.00 | 50.00 |
| Tin and Terneplate: (per base box) | | | | |
| Tinplate (1.50 lb.) cokes | \$10.30 | \$10.30 | \$10.30 | \$9.95 |
| Tin plates, electro (0.50 lb.) | 9.00 | 9.00 | 9.00 | 8.65 |
| Special coated mfg. ternes | 9.55 | 9.55 | 9.55 | 9.20 |
| Bars and Shapes: (per pound) | | | | |
| Merchant bar | 5.425¢ | 5.425¢ | 5.425¢ | 5.075¢ |
| Cold finished bars | 7.30 | 7.30 | 7.30 | 6.85 |
| Alloy bars | 6.475 | 6.475 | 6.475 | 6.125 |
| Structural shapes | 5.375 | 5.375 | 5.375 | 5.00 |
| Stainless bars (No. 302) | 45.00 | 45.00 | 45.00 | 43.25 |
| Wrought iron bars | 14.45 | 14.45 | 14.45 | 11.50 |
| Wire: (per pound) | | | | |
| Bright wire | 7.65¢ | 7.65¢ | 7.65¢ | 7.20¢ |
| Rails: (per 100 lb.) | | | | |
| Heavy rails | \$5.525 | \$5.525 | \$5.525 | \$5.275 |
| Light rails | 6.50 | 6.50 | 6.50 | 6.25 |
| Semifinished Steel: (per net ton) | | | | |
| Rerolling billets | \$77.50 | \$77.50 | \$77.50 | \$74.00 |
| Slabs, rerolling | 77.50 | 77.50 | 77.50 | 74.00 |
| Forging billets | 96.00 | 96.00 | 96.00 | 91.50 |
| Alloy blooms, billets, slabs | 114.00 | 114.00 | 114.00 | 107.00 |
| Wire Rods and Skelp: (per pound) | | | | |
| Wire rods | 6.15¢ | 6.15¢ | 6.15¢ | 5.80¢ |
| Skelp | 4.875 | 4.875 | 4.875 | 4.225 |
| Finished Steel Composite: (per pound) | | | | |
| Base price | 5.967¢ | 5.967¢ | 5.967¢ | 5.670¢ |

Finished Steel Composite

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Steel Scrap Composite

Averages of No. 1 heavy melting steel scrap delivered to consumers at Pittsburgh, Philadelphia and Chicago.

| | April 22 1958 | April 15 1958 | March 25 1958 | April 23 1957 |
|---|------------------|------------------|------------------|------------------|
| Pig Iron: (per gross ton) | | | | |
| Foundry, del'd Phila. | \$70.97 | \$70.97 | \$70.97 | \$68.88 |
| Foundry, Valley | 66.50 | 66.50 | 66.50 | 65.00 |
| Foundry, Southern Cinti | 73.87 | 73.87 | 73.87 | 67.17 |
| Foundry, Birmingham | 62.50 | 62.50 | 62.50 | 59.00 |
| Foundry, Chicago | 66.50 | 66.50 | 66.50 | 65.00 |
| Basic, del'd Philadelphia | 70.47 | 70.47 | 70.47 | 68.38 |
| Basic, Valley furnace | 66.00 | 66.00 | 66.00 | 64.50 |
| Malleable, Chicago | 66.50 | 66.50 | 66.50 | 65.00 |
| Malleable, Valley | 66.50 | 66.50 | 66.50 | 65.00 |
| Ferromanganese 74-76 pct Mn, cents per lb. | 12.25 | 12.25 | 12.25 | 12.75 |
| Pig Iron Composite: (per gross ton) | \$66.49 | \$66.49 | \$66.49 | \$64.56 |
| Scrap: (per gross ton) | | | | |
| No. 1 steel, Pittsburgh | \$32.50 | \$32.50 | \$34.50 | \$42.50 |
| No. 1 steel, Phila. area | 35.50 | 36.50 | 38.00 | 45.50 |
| No. 1 steel, Chicago | 27.50 | 29.50 | 32.50 | 38.50 |
| No. 1 bundles, Detroit | 21.50 | 21.50 | 27.50 | 34.50 |
| Low phos., Youngstown | 32.50 | 32.50 | 35.50 | 42.50 |
| No. 1 mach'y cast, Pittsburgh | 48.50 | 49.50 | 51.50 | 49.50 |
| No. 1 mach'y cast, Phila. | 47.50 | 47.50 | 49.50 | 55.50 |
| No. 1 mach'y cast, Chicago | 41.50 | 43.50 | 48.50 | 44.50 |
| Steel Scrap Composite: (per gross ton) | | | | |
| No. 1 hvy. melting scrap | \$31.83 | \$32.83 | \$35.00 | \$42.17 |
| No. 2 bundles | 23.17 | 24.83 | 26.17 | 34.50 |
| Coke Connellville: (per net ton at oven) | | | | |
| Furnace coke, prompt | \$15.38 | \$15.38 | \$15.38 | \$15.38 |
| Foundry coke, prompt | \$17.50-19 | \$17.50-19 | \$17.50-19 | \$17.50-19 |
| Nonferrous Metals: (cents per pound to large buyers) | | | | |
| Copper, electrolytic, Conn. | 25.00 | 25.00 | 25.00 | 32.00 |
| Copper, Lake, Conn. | 25.00 | 25.00 | 25.00 | 32.00 |
| Tin, Straits, N. Y. | 93.00* | 92.50* | 93.875 | 99.625 |
| Zinc, East St. Louis | 10.00 | 10.00 | 10.00 | 13.50 |
| Lead, St. Louis | 11.80 | 11.80 | 12.50 | 15.50 |
| Aluminum, virgin ingot | 26.10 | 26.10 | 28.10 | 27.10 |
| Nickel, electrolytic | 74.00 | 74.00 | 74.00 | 74.00 |
| Magnesium, ingot | 36.00 | 36.00 | 36.00 | 36.00 |
| Antimony, Laredo, Tex. | 29.50 | 29.50 | 29.50 | 33.00 |

* Tentative. † Average. * Revised.

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ROCKWELL SPRING AND AXLE COMPANY

BOSSERT DIVISION

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UTICA, NEW YORK

Scrap Stocks Mount In Dealer Yards

Uneasy trade eyes mounting inventories in their yards and at the mills.

Prices are close to the bottom in most markets. Hopes rest on a pickup in steel.

■ The market grows even weaker. The buildup of stocks, both at the mill and in dealer yards is continuing. It is becoming critical in some areas and markets that had resisted accumulation are now becoming glutted.

A lot of scrap has been laid down for speculation. But it has not moved, so even the speculative factor has been eliminated.

Auto list scrap is expected to provide an indicator of the market's real level. There is not much enthusiasm for the tonnage, but auto production is so small that it may prevent a more severe drop than would be expected from sizable lists.

Price reductions are not as general as in recent weeks, but this is only an indication that a bottom may have been reached; not any evidence of stabilizing.

The trade is generally agreed that an upturn of steel production will be required to lift prices from their present low levels. And there is no encouragement from the steel market.

Pittsburgh—Prices of openhearth grades are unchanged. Turnings, cast grades and railroad specialties are off \$1. One local consumer is offering from \$33 to \$35 for No. 1 bundles.

Chicago—The market continued to drift downward on scattered sales to mills on small tonnages. A heavy downward pressure prevails because of heavy mill inventories in the area, and depressed prices in nearby areas, notably Detroit. While stocks are not heavy in dealer yards at the moment, a buildup is beginning. Emergency sales are increasingly frequent. Angles and splice bars were incorrectly quoted at \$40 to \$45 in the April 17 issue. Correct quotation was \$44 to \$45.

Philadelphia — Prices are still falling. Openhearth scrap dropped \$1 based on an export price of \$34 for No. 1 heavy melting at the dock. If a domestic mill entered the market today, it would have to pay the \$34 price plus about \$2 for switching charges. The weakness also brought a \$1 drop in turnings, low phos, and heavy turnings grades. Electric furnace bundles are off \$2. Last week the price of cupola cast was inadvertently lowered \$2. The correct price is \$38-\$39.

New York — With domestic business at a standstill, export buyers cut prices \$2 a ton for openhearth grades to a top of \$28 for No. 1 heavy melting. Stainless business is nonexistent, with at least one large broker completely out of the market.

Detroit—About the only activity here is the accumulation of inventory in dealer yards. Dealers are waiting for industrial lists to close for a better idea of the market as mills continue to show little interest

in scrap. Industrial offerings for May are off considerably from the current month to a point that could keep prices from dropping too much. No price changes.

Cleveland — There are still no orders of any size out in the Cleveland or Youngstown districts, and no sign of any on the way. Some home scrap is being moved out of the district to save cash. Some production bundles were laid down on speculation this month and another price decline for this category is in prospect.

St. Louis—Mills continue to buy openhearth grades at unchanged prices, with the offerings light and just about sufficient to meet melting requirements. Movement is spotty.

Birmingham — Scrap buying in this area is on a very limited scale, with prices holding steady on most grades, slightly weaker on others. One consumer bought No. 2 heavy melting at only \$30 delivered, Atlanta, and found eager sellers. The cast market is soft and although some foundries are buying at lower prices, they are buying sparingly and not taking all the scrap offered at new levels.

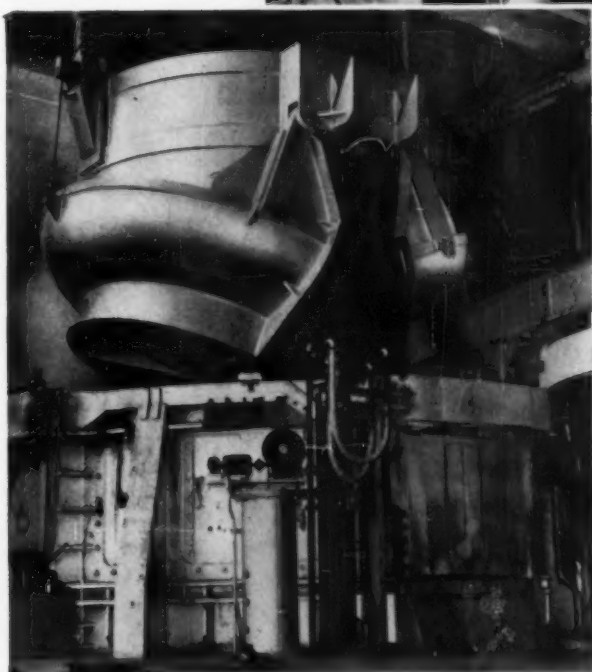
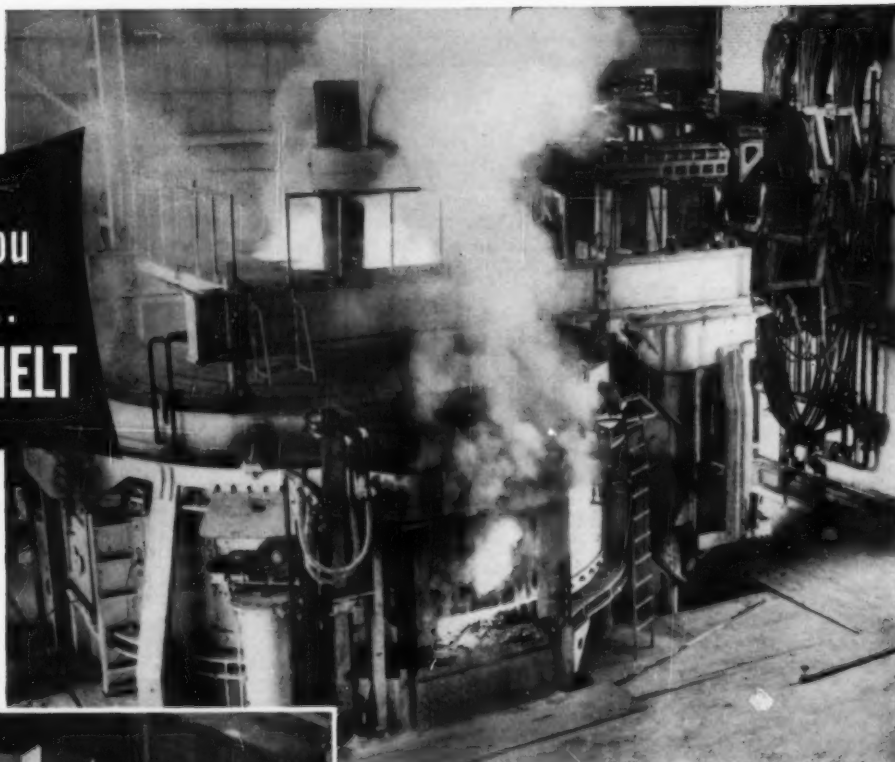
Cincinnati—The market is returning to a stand-off. Dealers won't sell at present prices and mills won't go up. Apparently, dealers are selling only enough each month to stay in the black and then sit tight.

Buffalo—The market dropped \$1 on appraisal of all except cast items which are holding firm. There is no demand for any item and dealers feel prices may decline even further.

Boston—There is some moderate export activity for No. 1 and No. 2 openhearth grades, but at unchanged prices. Otherwise, there is very little movement here.

West Coast—The market is quiet up and down the Coast. Little scrap is moving. There are renewed rumors of a stepup in exporting.

When you
melt...
LECTROMELT



first of a
powerful pair

200-ton heats are now being produced in this 24-foot Lectromelt Furnace. A second of similar capacity will soon be installed here in this Southern steel mill.

Catalog No. 10 describes Lectromelt furnace equipment for melting and refining. For a copy, write Lectromelt Furnace Division, McGraw-Edison Company, 312 32nd Street, Pittsburgh 30, Pennsylvania.

*Reg. Trademark U.S. Pat. Off.

Lectromelt*



CANADA: Canefco Limited, Toronto . . . ARGENTINA: Master Argentina, Buenos Aires . . . ITALY: Forni Stein, Genova . . . ENGLAND: Electric Furnace Co., Ltd., Weybridge . . . GERMANY: Demag-Elektrometallurgie, GmbH, Duisburg . . . SPAIN: General Electrica Espanola, Bilbao . . . FRANCE: Stein et Roubaix, Paris . . . BELGIUM: S. A. Stein & Roubaix, Bressoux-Liege . . . JAPAN: Daido Steel Company, Ltd., Nagoya



SCRAP PRICES

(Effective April 22, 1958)

Pittsburgh

| | |
|---------------------------|--------------------|
| No. 1 hvy. melting | \$32.00 to \$33.00 |
| No. 2 hvy. melting | 27.00 to 28.00 |
| No. 1 dealer bundles | 32.00 to 33.00 |
| No. 1 factory bundles | 36.00 to 37.00 |
| No. 2 bundles | 24.00 to 25.00 |
| No. 1 busheling | 32.00 to 33.00 |
| Machine shop turn. | 13.00 to 14.00 |
| Mixed bor. and ms. turn. | 13.00 to 14.00 |
| Shoveling turnings | 17.00 to 18.00 |
| Cast iron borings | 17.00 to 18.00 |
| Low phos. punch'g's plate | 36.00 to 37.00 |
| Heavy turnings | 28.00 to 29.00 |
| No. 1 RR hvy. melting | 35.00 to 36.00 |
| Scrap rails, random lgth. | 50.00 to 51.00 |
| Rails 2 ft and under | 54.00 to 55.00 |
| RR steel wheels | 45.00 to 46.00 |
| RR spring steel | 45.00 to 46.00 |
| RR couplers and knuckles | 45.00 to 46.00 |
| No. 1 machinery cast. | 48.00 to 49.00 |
| Cupola cast. | 40.00 to 41.00 |
| Heavy breakable cast. | 38.00 to 39.00 |
| Stainless | |
| 18-8 bundles and solids | 170.00 to 175.00 |
| 18-8 turnings | 105.00 |
| 430 bundles and solids | 95.00 to 100.00 |
| 410 turnings | 45.00 |

Chicago

| | |
|----------------------------|--------------------|
| No. 1 hvy. melting | \$27.00 to \$28.00 |
| No. 2 hvy. melting | 25.00 to 26.00 |
| No. 1 dealer bundles | 27.00 to 28.00 |
| No. 1 factory bundles | 33.00 to 34.00 |
| No. 2 bundles | 20.00 to 21.00 |
| No. 1 busheling | 27.00 to 28.00 |
| Machine shop turn. | 14.00 to 15.00 |
| Mixed bor. and turn. | 16.00 to 17.00 |
| Shoveling turnings | 16.00 to 17.00 |
| Cast iron borings | 16.00 to 17.00 |
| Low phos. punch'g's plate | 42.00 to 43.00 |
| Low phos. punch'g's plate | 35.00 to 36.00 |
| Low phos. 3 ft and under | 33.00 to 34.00 |
| No. 1 RR hvy. melting | 33.00 to 34.00 |
| Scrap rails, random lgth. | 43.00 to 44.00 |
| Rerolling rails | 52.00 to 53.00 |
| Rails 2 ft and under | 47.00 to 48.00 |
| Locomotive tires cut | 41.00 to 42.00 |
| Cut bolsters & side frames | 38.00 to 39.00 |
| Angles and splice bars | 42.00 to 43.00 |
| RR steel car axles | 52.00 to 53.00 |
| RR couplers and knuckles | 38.00 to 39.00 |
| No. 1 machinery cast. | 41.00 to 42.00 |
| Cupola cast. | 41.00 to 42.00 |
| Heavy breakable cast. | 32.00 to 33.00 |
| Cast iron brake shoes | 34.00 to 35.00 |
| Cast iron wheels | 30.00 to 31.00 |
| Malleable | 46.00 to 47.00 |
| Stove plate | 33.00 to 34.00 |
| Steel car wheels | 36.00 to 37.00 |
| Stainless | |
| 18-8 bundles and solids | 160.00 to 165.00 |
| 18-8 turnings | 80.00 to 90.00 |
| 430 bundles and solids | 90.00 to 95.00 |
| 430 turnings | 45.00 to 50.00 |

Philadelphia Area

| | |
|---------------------------|--------------------|
| No. 1 hvy. melting | \$35.00 to \$36.00 |
| No. 2 hvy. melting | 32.00 to 33.00 |
| No. 1 dealer bundles | 35.00 to 36.00 |
| No. 2 bundles | 24.00 to 25.00 |
| No. 1 busheling | 35.00 to 36.00 |
| Machine shop turn. | 14.00 to 15.00 |
| Mixed bor. short turn. | 15.00 to 16.00 |
| Cast iron borings | 16.00 to 17.00 |
| Shoveling turnings | 16.00 to 17.00 |
| Clean cast. chem. borings | 31.00 to 32.00 |
| Low phos. 5 ft and under | 39.00 to 40.00 |
| Low phos. 2 ft and under | 40.00 to 41.00 |
| Low phos. punch'g's | 40.00 to 41.00 |
| Elec furnace bundles | 35.00 to 36.00 |
| Heavy turnings | 31.00 to 32.00 |
| RR steel wheels | 43.50 to 44.50 |
| RR spring steel | 43.50 to 44.50 |
| Rails 18 in. and under | 57.00 to 58.00 |
| Cupola cast. | 38.00 to 39.00 |
| Heavy breakable cast. | 41.00 to 42.00 |
| Cast iron car wheels | 44.00 to 45.00 |
| Malleable | 60.00 to 61.00 |
| Unstripped motor blocks | 30.00 to 31.00 |
| No. 1 machinery cast. | 47.00 to 48.00 |

Cincinnati

| | |
|---|--------------------|
| Brokers buying prices per gross ton, on cars: | |
| No. 1 hvy. melting | \$28.50 to \$29.50 |
| No. 2 hvy. melting | 25.50 to 26.50 |
| No. 1 dealer bundles | 28.50 to 29.50 |
| No. 2 bundles | 19.00 to 20.00 |
| Machine shop turn. | 11.00 to 12.00 |
| Mixed bor. and turn. | 11.00 to 12.00 |
| Shoveling turnings | 13.00 to 14.00 |
| Cast iron borings | 11.00 to 12.00 |
| Low phos. 18 in. and under | 36.00 to 37.00 |
| Rails, random length | 43.00 to 44.00 |
| Rails, 18 in. and under | 53.00 to 54.00 |
| No. 1 cupola cast. | 38.00 to 39.00 |
| Hvy. breakable cast. | 32.00 to 33.00 |
| Drop broken cast. | 45.00 to 46.00 |

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Cleveland

| | |
|---------------------------------------|--------------------|
| No. 1 hvy. melting | \$28.00 to \$29.00 |
| No. 2 hvy. melting | 22.00 to 23.00 |
| No. 1 dealer bundles | 28.00 to 29.00 |
| No. 1 factory bundles | 30.00 to 31.00 |
| No. 2 bundles | 19.00 to 20.00 |
| No. 1 busheling | 28.00 to 29.00 |
| Machine shop turn. | 10.00 to 11.00 |
| Mixed bor. and turn. | 14.00 to 15.00 |
| Shoveling turnings | 14.00 to 15.00 |
| Cast iron borings | 14.00 to 15.00 |
| Cut structural & plates, 2 ft & under | 35.00 to 36.00 |
| Drop forge flashings | 28.00 to 29.00 |
| Low phos. punch'g's plate | 29.00 to 30.00 |
| Foundry steel, 2 ft & under | 32.00 to 33.00 |
| No. 1 RR hvy. melting | 34.50 to 35.50 |
| Rails 2 ft and under | 53.00 to 54.00 |
| Rails 18 in. and under | 54.00 to 55.00 |
| Railroad grate bars | 14.00 to 15.00 |
| Steel axle turnings | 17.00 to 18.00 |
| Railroad cast. | 46.00 to 47.00 |
| No. 1 machinery cast. | 45.00 to 46.00 |
| Stove plate | 42.00 to 43.00 |
| Malleable | 58.00 to 59.00 |
| Stainless | |
| 18-8 bundles | 160.00 to 165.00 |
| 18-8 turnings | 85.00 to 90.00 |
| 430 bundles | 80.00 to 90.00 |
| 430 turnings | 35.00 to 40.00 |

Buffalo

| | |
|---------------------------------------|--------------------|
| No. 1 hvy. melting | \$26.00 to \$27.00 |
| No. 2 hvy. melting | 23.50 to 24.50 |
| No. 1 busheling | 26.00 to 27.00 |
| No. 1 dealer bundles | 26.00 to 27.00 |
| No. 2 bundles | 20.50 to 21.50 |
| Machine shop turn. | 11.00 to 12.00 |
| Mixed bor. and turn. | 12.00 to 13.00 |
| Shoveling turnings | 14.00 to 15.00 |
| Cast iron borings | 13.00 to 14.00 |
| Low phos. plate | 32.00 to 33.00 |
| Structurals and plate, 2 ft and under | 35.00 to 36.00 |
| Scrap rails, random lgth. | 39.00 to 40.00 |
| Rails 2 ft and under | 49.00 to 50.00 |
| RR steel wheels | 36.00 to 37.00 |
| RR spring steel | 32.00 to 33.00 |
| RR couplers and knuckles | 32.00 to 33.00 |
| No. 1 machinery cast. | 45.00 to 46.00 |
| No. 1 cupola cast. | 41.00 to 42.00 |

St. Louis

| | |
|-------------------------|--------------------|
| No. 1 hvy. melting | \$33.00 to \$34.00 |
| No. 2 hvy. melting | 30.60 to 31.00 |
| No. 1 dealer bundles | 33.00 to 34.00 |
| No. 2 bundles | 25.00 to 26.00 |
| Machine shop turn. | 15.00 to 16.00 |
| Cast iron borings | 18.00 to 19.00 |
| Shoveling turnings | 18.00 to 19.00 |
| No. 1 RR hvy. melting | 35.00 to 36.00 |
| Rails, random length | 42.00 to 44.00 |
| Rails, 18 in. and under | 50.00 to 51.00 |
| Angles and splice bars | 45.00 to 46.00 |
| Std. steel car axles | 48.00 to 49.00 |
| RR specialties | 38.00 to 39.00 |
| Cupola cast. | 43.00 to 44.00 |
| Heavy breakable cast. | 32.00 to 33.00 |
| Cast iron brake shoes | 35.00 to 36.00 |
| Stove plate | 37.00 to 38.00 |
| Cast iron car wheels | 35.00 to 36.00 |
| Rerolling rails | 49.00 to 50.00 |
| Unstripped motor blocks | 34.00 to 35.00 |

Birmingham

| | |
|-----------------------------|--------------------|
| No. 1 hvy. melting | \$30.00 to \$31.00 |
| No. 2 hvy. melting | 25.00 to 26.00 |
| No. 1 dealer bundles | 30.00 to 31.00 |
| No. 2 bundles | 19.00 to 20.00 |
| No. 1 busheling | 30.00 to 31.00 |
| Machine shop turn. | 22.00 to 23.00 |
| Shoveling turnings | 23.00 to 24.00 |
| Cast iron borings | 12.00 to 13.00 |
| Electric furnace bundles | 35.00 to 36.00 |
| Elec. furnace, 3 ft & under | 33.00 to 34.00 |
| Bar crops and plate | 38.00 to 39.00 |
| Structural and plate, 2 ft. | 38.00 to 39.00 |
| No. 1 RR hvy. melting | 33.00 to 34.00 |
| Scrap rails, random lgth. | 41.00 to 42.00 |
| Rails, 18 in. and under | 47.00 to 48.00 |
| Angles & splice bars | 39.00 to 40.00 |
| Rerolling rails | 47.00 to 48.00 |
| No. 1 cupola cast. | 48.00 to 49.00 |
| Stove plate | 48.00 to 49.00 |
| Charging box cast. | 22.00 to 23.00 |
| Cast iron car wheels | 36.00 to 37.00 |
| Unstripped motor blocks | 37.00 to 38.00 |

Youngstown

| | |
|----------------------|--------------------|
| No. 1 hvy. melting | \$31.00 to \$32.00 |
| No. 2 hvy. melting | 25.00 to 26.00 |
| No. 1 dealer bundles | 31.00 to 32.00 |
| No. 2 bundles | 22.00 to 23.00 |
| Machine shop turn. | 12.00 to 13.00 |
| Shoveling turnings | 17.00 to 18.00 |
| Cast iron borings | 17.00 to 18.00 |
| Low phos. plate | 32.00 to 33.00 |

New York

| | |
|---|--------------------|
| Brokers buying prices per gross ton, on cars: | |
| No. 1 hvy. melting | \$27.00 to \$28.00 |
| No. 2 hvy. melting | 22.00 to 23.00 |
| No. 2 dealer bundles | 15.50 to 16.50 |
| Machine shop turn. | 7.00 to 8.00 |
| Mixed bor. and turn. | 10.00 to 11.00 |
| Shoveling turnings | 11.00 to 12.00 |
| Clean cast. chem. borings | 22.00 to 23.00 |
| No. 1 machinery cast. | 35.00 to 36.00 |
| Mixed yard cast. | 34.00 to 35.00 |
| Charging box cast. | 32.00 to 33.00 |
| Heavy breakable cast. | 32.00 to 33.00 |
| Unstripped motor blocks | 25.00 to 26.00 |
| Stainless | |
| 18-8 prepared solids | 135.00 to 140.00 |
| 18-8 turnings | 45.00 to 50.00 |
| 430 prepared solids | 65.00 to 70.00 |
| 430 turnings | 29.00 to 25.00 |

Detroit

| | |
|---|--------------------|
| Brokers buying prices per gross ton, on cars: | |
| No. 1 hvy. melting | \$21.00 to \$22.00 |
| No. 2 hvy. melting | 16.00 to 17.00 |
| No. 1 dealer bundles | 23.00 to 23.00 |
| No. 2 bundles | 12.00 to 13.00 |
| No. 1 busheling | 21.00 to 22.00 |
| Drop forge flashings | 30.00 to 31.00 |
| Machine shop turn. | 5.00 to 6.00 |
| Mixed bor. and turn. | 6.00 to 7.00 |
| Shoveling turnings | 7.00 to 8.00 |
| Cast iron borings | 7.00 to 8.00 |
| Low phos. punch'g's plate | 22.00 to 23.00 |
| No. 1 cupola cast. | 31.00 to 32.00 |
| Heavy breakable cast. | 31.00 to 32.00 |
| Mixed cupola cast. | 26.00 to 27.00 |
| Automotive cast. | 31.00 to 32.00 |
| Stainless | |
| 18-8 bundles and solids | 170.00 to 175.00 |
| 18-8 turnings | 70.00 to 75.00 |
| 430 bundles and solids | 90.00 to 95.00 |
| 410 turnings | 25.00 to 30.00 |

Boston

| | |
|---|--------------------|
| Brokers buying prices per gross ton, on cars: | |
| No. 1 hvy. melting | \$23.00 to \$24.00 |
| No. 2 hvy. melting | 19.00 to 20.00 |
| No. 1 dealer bundles | 23.00 to 24.00 |
| No. 2 bundles | 12.00 to 14.00 |
| No. 1 busheling | 23.00 to 24.00 |
| Elec. furnace, 3 ft & under | 39.00 to 40.00 |
| Machine shop turn. | 5.00 to 6.00 |
| Mixed bor. and short turn. | 6.00 to 7.00 |
| Shoveling turnings | 9.00 to 10.00 |
| Clean cast. chem. borings | 18.00 to 19.00 |
| No. 1 machinery cast. | 31.00 to 32.00 |
| Mixed cupola cast. | 28.00 to 29.00 |
| Heavy breakable cast. | 29.00 to 30.00 |
| Stove plate | 26.00 to 27.00 |
| Unstripped motor blocks | 34.00 to 35.00 |

San Francisco

| | |
|-----------------------|---------|
| No. 1 hvy. melting | \$32.00 |
| No. 2 hvy. melting | 30.00 |
| No. 1 dealer bundles | 28.00 |
| No. 2 bundles | 22.00 |
| Machine shop turn. | 15.00 |
| Cast iron borings | 16.00 |
| No. 1 RR hvy. melting | 32.00 |
| No. 1 cupola cast. | 42.00 |

Los Angeles

| | |
|--------------------------------------|-----------------|
| No. 1 hvy. melting | \$34.00 |
| No. 2 hvy. melting | 32.00 |
| No. 1 dealer bundles | 30.00 |
| No. 2 bundles | 22.00 |
| Machine shop turn. | \$9.00 to 11.00 |
| Shoveling turnings | 11.00 to 13.00 |
| Cast iron borings | 11.00 to 13.00 |
| Elec. furn. 1 ft and under (foundry) | 45.00 |
| No. 1 RR hvy. melting | 36.00 |
| No. 1 cupola cast. | 41.00 to 43.00 |

Seattle

| | |
|--------------------|---------|
| No. 1 hvy. melting | \$32.00 |
| No. 2 hvy. melting | 30.00 |
| No. 2 bundles | 24.00 |
| No. 1 cupola cast. | 16.00 |
| Mixed yard cast. | 36.00 |

Hamilton, Ont.

| | |
|----------------------------|------------------|
| No. 1 hvy. melting | \$30.00 |
| No. 2 hvy. melting | 26.00 |
| No. 1 dealer bundles | 30.00 |
| No. 2 bundles | 23.00 |
| Bush., new fact., unprep'd | 26.00 |
| Bush., new fact., unprep'd | 28.00 |
| Machine shop turn. | 15.00 |
| Short steel turn. | 19.00 |
| Mixed bor. and turn. | 15.00 |
| Rails, rerolling | 39.00 |
| Cast scrap | \$45.00 to 50.00 |

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Scrap

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Is a World Copper Group Likely?

The trade in this country says no.

But Chile is making some moves that could be aimed in this direction.

■ What are the chances for an international copper agreement? A world-wide organization of producers aimed at stabilizing price and production? Or even a pact at a governmental level?

Almost none, says most of the trade in this country. The absence of U. S. producers would hamper its effectiveness. And U. S. producers just aren't interested.

Aggressive Action—But outside the U. S. the reaction is not nearly so negative. Chile, whose economy depends on copper, is making some positive moves that could be aimed in this direction.

Most dramatic: Chilean President Carlos Ybanez unexpectedly called off his scheduled visit to this country, and the White House, at the eleventh hour. The reason given: Pressure of political and administrative problems.

The softness of world copper prices has made Chile's economic situation more sensitive. But few believe this is the real reason. It has been widely "leaked" from high in the Chilean Copper Dept. that this is a diplomatic slap at the Administration, and particularly Interior Secretary Seaton for supporting a copper tariff, perhaps as high as 4¢ per lb.

Asks the U. N.—Chile's most pointed move toward an international copper group was her official request that the United Nations'

Commission on International Commodity Trade consider world copper with a view toward actually creating a control body.

The UN group is scheduled to meet in New York, May 5 to 16.

Chile is also threatening to break the solid front of Free World producers and sell copper to the U. S. S. R. The issue has come up before when Chile entertained Russian and Red Chinese trade delegations. But this time representatives have been sent to Moscow.

Trade Bait—It's still too early to really tell, but many observers say Chile is doing this to have something to trade for concessions on copper control in Free World markets. Their reasoning: It is no secret that almost all of Chile's 1958 copper output is already committed.

Adding fuel to the speculation on the possibility of a world copper group is that several times in the last six months or so, representatives of many major copper producers, including Chile but excepting U. S. producers, met in London. Very little was made public about what was specifically discussed. The announced agenda: What can be done to firm up world copper markets.

U. S. Tariff—In the U. S., a 1.7¢ per lb copper tariff after June 30 is beginning to look like a sure thing. For the last seven years Congress has annually suspended the copper tariff. The current suspension expires on June 30.

But Interior Secretary Fred Seaton has asked Congress not to suspend the duty this year. The word from Capitol Hill is that he has more than enough congressional support.

As long as the domestic price is more than 24¢ per lb, the tariff will be 1.7¢.

Kennecott Copper Co. believes reduced production is the way toward a balanced market. And it is backing up its idea with action.

The company announced the third reduction in its U. S. operations this year. Individual divisions will be permitted to revise their own schedules within the overall plan.

Aluminum

U. S. production in March turned out to be a bit of a surprise. Despite soft markets, the Aluminum Assn. reports output was 137,916 tons, higher than the 135,706 tons produced in March 1957.

Magnesium

The Magnesium Assn. report on castings shipments in February had the trade looking for bright spots. They found a few—sand castings were up to 479 tons from 423 tons in January. But total casting shipments were down to 903 tons from 940 tons in January.

Tin prices for the week: April 16—92.875; April 17—92.75; April 18—92.50; April 21—93.00; April 22—93.00*.

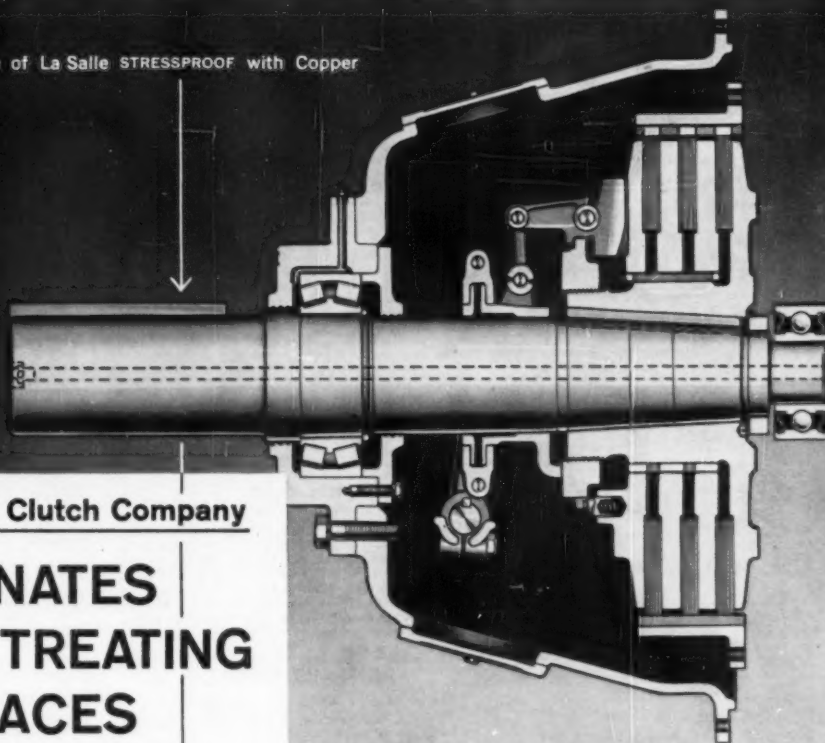
* Estimate

Primary Prices

| (cents per lb) | Current price | last price | date of change |
|-----------------|---------------|------------|----------------|
| Aluminum pig | 24.00 | 26.00 | 4/1/58 |
| Aluminum ingot | 26.10 | 26.10 | 4/1/58 |
| Copper (E) | 25.00 | 27.00 | 1/13/58 |
| Copper (CS) | 23.50 | 24.00 | 4/8/58 |
| Copper (L) | 25.00 | 27.00 | 1/13/58 |
| Lead, St. L. | 11.00 | 12.00 | 4/2/58 |
| Lead, N. Y. | 12.00 | 13.00 | 4/2/58 |
| Magnesium ingot | 36.00 | 34.00 | 8/13/56 |
| Magnesium pig | 35.25 | 33.75 | 8/13/56 |
| Nickel | 74.00 | 84.50 | 12/8/56 |
| Titanium sponge | 185-200 | 200-250 | 4/1/58 |
| Zinc, E. St. L. | 10.00 | 10.50 | 7/1/57 |
| Zinc, N. Y. | 10.50 | 11.00 | 7/1/57 |

ALUMINUM: 99% ingot frt allwd. **COPPER:** (E) = electrolytic, (CS) = custom smelters, electrolytic. (L) = lake. **LEAD:** common grade. **MAGNESIUM:** 99.8% pig Velasco, Tex. **NICKEL:** Port Colbourne, Canada. **ZINC:** prime western. **TIN:** see above; other primary prices, pg. 200.

Shaft Made of La Salle STRESSPROOF with Copper



Twin Disc Clutch Company

ELIMINATES HEAT TREATING FURNACES

by using

STRESSPROOF®

with copper

STEEL BARS

In Racine, Wisconsin, Twin Disc Clutch Co. saved money on a plant addition by eliminating heat treating furnaces . . . and they continue to save on part costs by using a material which needs no heat treatment . . . STRESSPROOF.

On the strength of over 15 years' experience with STRESSPROOF, Twin Disc knew they could cut their costs by purchasing this material which has the necessary properties in the bar.

They produce about 150 different models of power take-off shafts . . . see cross-section drawing. These shafts must possess great toughness and have the strength to take heavy loads. They must resist wear at the journals. Because one end of each shaft must be machined to individual customer specifications, machinability is important. Warpage after machining cannot be tolerated.

Twin Disc power take-off unit
Used to transmit power from industrial internal combustion engines.



STRESSPROOF with copper fills these requirements on all counts because it has these four qualities in the bar: (1) Strength without heat treating. (2) Machinability (copper further improves machinability). (3) Excellent resistance to wear. (4) Minimum warpage.

By using STRESSPROOF, Twin Disc eliminates the cost of heat treating, cleaning and straightening. Working conditions are better . . . the plant is cleaner and cooler, and floor space requirements are less. Time and money consuming production steps are eliminated.

Twin Disc gets better parts at lower cost, and perhaps you can profit by their experience. Unless you have investigated STRESSPROOF recently, you may be overlooking worthwhile savings, especially since copper has now been added to improve machinability.

Available from your Steel Service Center.

La Salle STEEL COMPANY

1436 150th Street, Hammond, Indiana



Please send literature describing La Salle STRESSPROOF with copper.

name _____

title _____

company _____

address _____

city _____ zone _____ state _____

NONFERROUS PRICES

MILL PRODUCTS

(Cents per lb unless otherwise noted)

ALUMINUM

(Base 30,000 lb, f.o.b. ship. pt., frt. allowed)

Flat Sheet (Mill Finish) and Plate
("F" temper except 6061-0)

| Alloy | .082 | .081 | .136- .249 | 250- 3 |
|------------|------|------|---------------|-----------|
| 1100, 3003 | 44.6 | 42.3 | 41.1 | 41.7 |
| 5052 | 52.0 | 46.9 | 45.2 | 44.4 |
| 6061-0 | 49.4 | 45.0 | 43.2 | 43.1 |

Extruded Solid Shapes

| Factor | 6063 T-5 | 6062 T-6 |
|--------|-----------|-----------|
| 6-8 | 45.0-46.8 | 58.4-62.1 |
| 12-14 | 45.7-47.2 | 59.3-63.8 |
| 24-26 | 49.0-49.5 | 70.1-74.8 |
| 36-38 | 58.0-58.6 | 94.2-97.8 |

Screw Machine Stock—2011-T-3

| Size" | 1/4 | 5/8-5/16 | 3/4-1 | 1 1/4-1 1/2 |
|-------|------|----------|-------|-------------|
| Price | 61.0 | 60.5 | 59.0 | 56.6 |

Roofing Sheet, Corrugated

(Per sheet, 26" wide base, 16,000 lb)

| Length"→ | 72 | 96 | 120 | 144 |
|-----------|--------|--------|--------|--------|
| .019 gage | 81.411 | 81.884 | 82.353 | 82.823 |
| .024 gage | 1.762 | 2.349 | 2.937 | 3.524 |

MAGNESIUM

(F.o.b. shipping Pt., carload frt. allowed)

Sheet and Plate

| Type↓ | Gage→ | .250 3.00 | .250- 2.00 | .188 | .081 | .032 |
|-----------------------|-------|--------------|---------------|-------|-------|------|
| AZ31B Stand, Grade | | 67.9 | 69.0 | 77.9 | 108.1 | |
| AZ31B Spec. | | 93.3 | 95.7 | 106.7 | 171.3 | |
| Tread Plate | | 70.6 | 71.7 | | | |
| Tooling Plate | | 73.0 | | | | |

Extruded Shapes

| Factor→ | 6-8 | 12-14 | 24-26 | 36-38 |
|---------------------------|------|-------|-------|-------|
| Comm. Grade. (AZ31C) | 69.6 | 70.7 | 75.6 | 89.2 |
| Spec. Grade... (AZ31B) | 84.6 | 85.7 | 90.6 | 104.3 |

Alloy Ingot

AZ91B (Die Casting) 37.25 (delivered)
AZ63A, AZ92A, AZ91C (Sand Casting) 40.75 (Volaco, Tex.)

NICKEL, MONEL, INCONEL

(Base prices, f.o.b. mill)

| | "A" Nickel Monel | Inconel |
|---------------|------------------|---------|
| Sheet, CR | 126 | 106 |
| Strip, CR | 124 | 108 |
| Rod, bar, HR | 107 | 89 |
| Angles, HR | 107 | 89 |
| Plates, HR | 120 | 105 |
| Seamless tube | 157 | 129 |
| Shot, blocks | 87 | ... |

COPPER, BRASS, BRONZE

(Freight included in 5000 lbs)

| | Sheet | Wire | Rod | Tube |
|--------------|-------|-------|-------|-------|
| Copper | 48.13 | 45.36 | 48.32 | |
| Brass, 70/30 | 42.69 | 43.23 | 42.63 | 45.60 |
| Brass, Low | 44.90 | 45.44 | 44.84 | 47.71 |
| Brass, R L | 45.67 | 46.21 | 45.61 | 48.48 |
| Brass, Naval | 47.07 | 41.38 | 50.48 | |
| Muntz Metal | 45.19 | 41.00 | | |
| Comm. Br. | 46.98 | 47.52 | 46.92 | 49.54 |
| Mang. Br. | 50.81 | 44.91 | | |
| Phos. Br. 5% | 67.17 | 67.67 | | |

Free Cutting Brass Rod 31.03

TITANIUM

(Freight included in 5000 lbs)

Sheet and strip, commercially pure, \$9.50-\$10.60; alloy, \$14.75; Plate, HR, commercially pure, \$8.00-\$8.75; alloy, \$10.75. Wire, rolled and/or drawn, commercially pure, \$7.50-\$8.00; alloy, \$10.00. Bar, HR or forged, commercially pure, \$6.15-\$6.40; alloy, \$6.15-\$6.35; billets, HR, commercially pure, \$6.00-\$6.25; alloy, \$6.00-\$6.26.

PRIMARY METAL

(Cents per lb unless otherwise noted)

Antimony, American, Laredo, Tex., 29.50
Beryllium aluminum 5% Be, Dollar
per lb contained Be \$74.75
Beryllium copper, per lb contained Be \$43.00
Beryllium 97% lump or beads, f.o.b. Cleveland, Reading \$71.50
Bismuth, ton lots \$2.25
Cadmium, del'd \$1.55
Calcium, 99.9% small lots \$4.55
Chromium, 99.8% metallic basis \$1.31
Cobalt, 97-99% (per lb) \$2.00 to \$2.07
Germanium, per gm, f.o.b. Miami, Okla., refined \$9.50 to \$50.00
Gold, U. S. Treas., per troy oz. \$35.00
Indium, 99.9%, dollars per troy oz. \$2.25
Iridium, dollars per troy oz. \$80 to \$90
Lithium, 98% \$11.00 to \$14.00
Magnesium, sticks, 100 to 500 lb. 59.00
Mercury, dollars per 76-lb flask, f.o.b. New York \$231 to \$235
Nickel oxide sinter at Copper Cliff, Ont., contained nickel 71.25
Palladium, dollars per troy oz. \$19 to \$21
Platinum, dollars per troy oz. \$67 to \$72
Rhodium \$120.00 to \$125.00
Silver ingots (\$ per troy oz.) \$8.625
Thorium, per kg. \$43.00
Vanadium \$3.45
Zirconium sponge \$5.00

Remelted Metals

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5 ingot
No. 115 25.25
No. 120 24.25
No. 123 23.50
80-10-10 ingot
No. 305 29.25
No. 315 27.25
88-10-2 ingot
No. 210 36.25
No. 215 32.00
No. 245 28.75
Yellow ingot
No. 405 21.25
Manganese bronze
No. 421 23.00

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys
0.30 copper max. 24.00-24.25
0.60 copper max. 23.75-24.00
Pluton alloys (No. 122 type) 23.25-24.25
No. 12 alum. (No. 2 grade) 21.00-21.75
108 alloy 21.50-22.25
195 alloy 24.00-25.50
13 alloy (0.60 copper max.) 23.75-24.00
AXS-679 (1 pct zinc) 21.25-22.25

Steel deoxidizing aluminum notch bar granulated or shot

Grade 1—95-97 1/2% 22.00-23.50
Grade 2—92-95% 21.00-21.75
Grade 3—90-92% 20.00-20.75
Grade 4—85-90% 17.50-18.50

SCRAP METALS

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

| | Heavy | Turnings |
|-----------------------|--------|----------|
| Copper | 21 | 20 1/4 |
| Yellow brass | 16 1/4 | 14 1/4 |
| Red brass | 18 1/4 | 17 1/4 |
| Comm. bronze | 19 1/4 | 18 1/4 |
| Mang. bronze | 14 1/4 | 14 1/4 |
| Yellow brass rod ends | 15 1/4 | |

Customs Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire 19 1/4
No. 2 copper wire 18
Light copper 15 1/4
*Refinery brass 17 1/4
Copper bearing material 16 1/4
*Dry copper content

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire 19 1/4
No. 2 copper wire 18
Light copper 15 1/4
No. 1 composition 18 1/4
No. 1 comp. turnings 18
Hvy. yellow brass solids 15
Brass pipe 15
Radiators 14 1/4

Mixed old cast. Aluminum 12 — 13
Mixed new clips 14 1/4 — 15 1/4
Mixed turnings, dry 12 1/4 — 13 1/4

Dealers' Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Copper and Brass

No. 1 copper wire 17 1/4 — 18
No. 2 copper wire 15 1/4 — 16
Light copper 13 1/4 — 14
Auto radiators (unsweated) 11 — 11 1/4
No. 1 composition 14 1/4 — 15
No. 1 composition turnings 13 1/4 — 14
Cocks and faucets 12 — 12 1/4
Clean heavy yellow brass 10 — 10 1/4
Brass pipe 13 — 13 1/4
New soft brass clippings 13 — 13 1/4
No. 1 brass rod turnings 10 1/4 — 11

Aluminum

Alum. pistons and struts 5 — 5 1/4
Aluminum crankcases 9 1/4 — 10
1100 (2S) aluminum clippings 12 1/4 — 13
Old sheet and utensils 9 1/4 — 10
Borings and turnings 6 — 6 1/4
Industrial castings 9 1/4 — 10
2024 (24S) clippings 11 — 11 1/4

Zinc

New zinc clippings 4 — 4 1/4
Old zinc 3 — 3 1/4
Zinc routings 1 1/2 — 2
Old die cast scrap 1 1/4 — 1 1/2

Nickel and Monel

Pure nickel clippings 42-45
Clean nickel turnings 37-40
Nickel anodes 42-45
Nickel rod ends 42-45
New Monel clippings 28-29
Clean Monel turnings 20-23
Old sheet Monel 25-26
Nickel silver clippings, mixed 18
Nickel silver turnings, mixed 15

Lead

Soft scrap lead 7 1/2 — 8
Battery plates (dry) 2 1/2 — 3
Batteries, acid free 1 1/4 — 2

Miscellaneous

Block tin 75 — 76
No. 1 pewter 59 — 60
Auto babbitt 39 — 40
Mixed common babbitt 11 — 11 1/4
Solder joints 14 1/2 — 15
Siphon tops 12 — 12 1/4
Small foundry type 12 — 12 1/4
Monotype 12 — 12 1/4
Lino. and stereotype 11 — 11 1/4
Electrotype 10 — 10 1/4
Hand picked type shells 7 — 7 1/4
Lino. and stereo. dross 3 — 3 1/4
Electro dross 2 1/4 — 2 1/2

| IRON AGE | | <i>Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.</i> | | | | | | | | | | | | |
|--------------|---|--|------------------------|----------------------|----------|--------------------|-------------------|--------------------|-------------------|--------------------------|------------------------|------------------------|------------------|----------------------|
| STEEL PRICES | | BILLETS, BLOOMS, SLABS | | | PIL-ING | SHAPES STRUCTURALS | | | STRIP | | | | | |
| | | Carbon Re-rolling Net Ton | Carbon Forging Net Ton | Alloy Net Ton | | Carbon | Hi Str. Low Alloy | Carbon Wide Flange | Hot-rolled | Cold-rolled | Hi Str. H.R. Low Alloy | Hi Str. C.R. Low Alloy | Alloy Hot-rolled | Alloy Cold-rolled |
| EAST | Bethlehem, Pa. | | | \$114.00 B3 | | 5.325 B3 | 7.80 B3 | 5.325 B3 | | | | | | |
| | Buffalo, N. Y. | \$77.50 R3, B3 | \$96.00 R3, B3 | \$114.00 R3, B3 | 6.225 B3 | 5.325 B3 | 7.80 B3 | 5.325 B3 | 4.925 R3, B3 | 7.15 S10 | 7.325 B3 | | | |
| | Phila., Pa. | | | | | | | | | 7.70 P15 | | | | |
| | Harrison, N. J. | | | | | | | | | | | | | 15.05 C11 |
| | Conschocken, Pa. | | \$101.00 A2 | \$121.00 A2 | | | | | 4.975 A2 | 7.20 A2 | 7.325 A2 | | | |
| | New Bedford, Mass. | | | | | | | | | 7.60 R6 | | | | |
| | Johnstown, Pa. | \$77.50 B3 | \$96.00 B3 | \$114.00 B3 | | 5.325 B3 | 7.80 B3 | | | | | | | |
| | Boston, Mass. | | | | | | | | | 7.70 T8 | | | | 15.40 T8 |
| | New Haven, Conn. | | | | | | | | | 7.60 D1 | | | | |
| | Baltimore, Md. | | | | | | | | | 7.15 T8 | | | | |
| | Phoenixville, Pa. | | | | | 5.325 P2 | | 5.325 P2 | | | | | | |
| | Sparrows Pt., Md. | | | | | | | | 4.925 B3 | | 7.325 B3 | | | |
| | Bridgeport, Wallingford, Conn. | | | \$114.00 N8 | | | | | | 7.60 W1 | | | | |
| | Pawtucket, R. I. Worcester, Mass. | | | | | | | | | 7.70 N7 7.70 A5 | | | | 15.40 N7 15.20 T8 |
| MIDDLE WEST | Alton, Ill. | | | | | | | | 5.125 L1 | | | | | |
| | Ashland, Ky. | | | | | | | | 4.925 A7 | | | | | |
| | Canton-Massillon, Dover, Ohio | | \$96.00 R3 | \$114.00 R3, T5 | | | | | | 7.15 G4 | | 10.45 G4 | | 14.85 C11 |
| | Chicago, Ill. Franklin Park, Ill. Evanston, Ill. | \$77.50 U1, R3 | \$96.00 U1, R3, W8 | \$114.00 U1, R3, W8 | 6.225 U1 | 5.275 U1, W8, P13 | 7.75 U1, Y1 W8 | 5.275 U1 | 4.925 W8, N4, A1 | 7.25 A1, T8 M8 | | | 8.10 W8, S9, I3 | 15.05 A1, S9, G4 |
| | Cleveland, Ohio | | | | | | | | | 7.15 A5, J3 | | 10.45 A5 | 8.10 J3 | |
| | Detroit, Mich. | | | \$114.00 R5 | | | | | 5.025 G3, M2 | 7.25 M2, D1, D2, G3, P11 | 7.425 G3 | 10.60 D2 10.35 G1 | 8.10 G3 | |
| | Anderson, Ind. | | | | | | | | | 7.15 G4 | | | | |
| | Duluth, Minn. | | | | | | | | | | | | | |
| | Gary, Ind. Harbor, Indiana | \$77.50 U1 | \$96.00 U1 | \$114.00 U1, Y1 | | 5.275 U1, I3 | 7.75 U1, I3 | 5.275 I3 | 4.925 U1, I3, Y1 | 7.15 Y1 | 7.325 U1, I3, Y1 | 10.60 Y1 | 8.10 U1, Y1 | |
| | Sterling, Ill. | \$77.50 N4 | | | | 5.275 N4 | | | 5.025 N4 | | | | | |
| | Indianapolis, Ind. | | | | | | | | | 7.30 J3 | | | | 15.20 J3 |
| | Newport, Ky. | | | | | | | | | | | | 8.10 A9 | |
| | Middletown, Ohio | | | | | | | | | | | | | |
| | Niles, Warren, Ohio Sharon, Pa. | | \$96.00 S1, C10 | \$114.00 C10, S1 | | | | | 4.925 R3, S1 | 7.15 R3, T4 S1 | 7.325 R3, S1 | 10.50 S1 10.45 R3 | 8.10 S1 | 15.05 S1 |
| | Owensboro, Ky. | \$77.50 G5 | \$96.00 G5 | \$114.00 G5 | | | | | | | | | | |
| | Pittsburgh, Pa. Midland, Pa. Butler, Pa. Aliquippa, Pa. | \$77.50 U1, P6 | \$96.00 U1, C11, P6 | \$114.00 U1, C11, B7 | 6.225 U1 | 5.275 U1, J3 | 7.75 U1, J3 | 5.275 U1 | 4.925 P6 | 7.15 J3, B4, S2 | | | 8.10 S9 | 15.05 S9 |
| | Weirton, Wheeling, Follansbee, W. Va. | | | | 6.225 W3 | 5.275 W3 | | 5.275 W3 | 4.925 W3 | 7.15 W3, F3 | 7.325 W3 | 10.50 W3 | | |
| | Youngstown, Ohio | \$77.50 R3 | \$96.00 Y1, C10 | \$114.00 Y1 | | | 7.75 Y1 | | | 7.15 Y1, J3 | 7.325 U1, Y1 | 10.65 Y1 | 8.10 U1, Y1 | 15.05 J3 10.65 Y1 |
| WEST | Fontana, Cal. | \$88.00 K1 | \$105.50 K1 | \$135.00 K1 | | 6.075 K1 | 8.55 K1 | 6.225 K1 | 5.675 K1 | 9.00 K1 | | | | |
| | Geneva, Utah | | \$96.00 C7 | | | 5.275 C7 | 7.75 C7 | | | | | | | |
| | Kansas City, Mo. | | | | | 5.375 S2 | 7.85 S2 | | | | | | 8.35 S2 | |
| | Los Angeles, Torrance, Cal. | | \$105.50 B2 | \$134.00 B2 | | 5.975 C7, B2 | 8.45 B2 | | 5.675 C7, B2 | 9.05 J3 9.20 C1 | | | 9.30 B2 | 17.25 J3 |
| | Minnequa, Colo. | | | | | 5.575 C6 | | | 6.025 C6 | 9.10 K1 | | | | |
| | Portland, Ore. | | | | | 6.025 O2 | | | | | | | | |
| | San Francisco, Niles, Pittsburg, Cal. | | \$105.50 B2 | | | 5.925 B2 | 8.40 B2 | | 5.675 C7, B2 | | | | | |
| | Seattle, Wash. | | \$109.50 B2 | | | 6.025 B2 | 8.50 B2 | | 5.925 B2 | | | | | |
| | Atlanta, Ga. | | | | | 5.475 A8 | | | 4.925 A8 | | | | | |
| SOUTH | Fairfield, Ala. City, Birmingham, Ala. | \$77.50 T2 | \$96.00 T2 | | | 5.275 T2, R3, C16 | 7.75 T2 | | 4.925 T2, R3, C16 | | 7.325 T2 | | | |
| | Houston, Lone Star, Texas | | \$101.00 S2 | \$119.00 S2 | | 5.375 S2 | 7.85 S2 | | | | | | 8.35 S2 | |
| | | | | | | | | | | | | | | |

IRON AGE

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

STEEL
PRICES

| STEEL PRICES | | SHEETS | | | | | | | WIRE ROD | TINPLATE† | | BLACK PLATE | |
|--|---|---------------------------------|--------------------|----------------|--------------------|-------------------|------------------------------|------------------------------|-------------------------------|-----------------------------|--|----------------------------------|----------------------------------|
| | | Hot-rolled 18 ga. & hvyr. | Cold-rolled | Galvanized | Enamel- ing | Long Terné | Hi Str. Low Alloy H.R. | Hi Str. Low Alloy C.R. | Hi Str. Low Alloy Galv. | | Cokes* 1.25-lb. base box | Electro* 0.25-lb. base box | Holloware Enameling 29 ga. |
| EAST | Bethlehem, Pa. | | | | | | | | | | | | |
| | Buffalo, N. Y. | 4.925 B3 | 6.05 B3 | | | | 7.275 B3 | 8.975 B3 | | 6.15 W6 | † Special coated mfg. terne deduct 50¢ from 1.25-lb. coke base box price. Can-making quality blackplate 55 to 125 lb. deduct \$2.20 from 1.25 lb. coke base box. * COKES: 1.50-lb. add 25¢. ELECTRO: 0.50-lb. add 25¢; 0.75-lb. add 65¢; 1.00-lb. add \$1.00. Differ- ential 1.00 lb. 0.25 lb. add 65¢. | | |
| | Claymont, Del. | | | | | | | | | | | | |
| | Coatesville, Pa. | | | | | | | | | | | | |
| | Conshohocken, Pa. | 4.975 A2 | 6.10 A2 | | | | 7.325 A2 | | | | | | |
| | Harrisburg, Pa. | | | | | | | | | | | | |
| | Hartford, Conn. | | | | | | | | | | | | |
| | Johnstown, Pa. | | | | | | | | 6.15 B3 | | | | |
| | Fairless, Pa. | 4.975 U1 | 6.10 U1 | | | | 7.325 U1 | 9.025 U1 | | | \$10.15 U1 | \$8.85 U1 | |
| | New Haven, Conn. | | | | | | | | | | | | |
| | Phoenixville, Pa. | | | | | | | | | | | | |
| Sparrows Pt., Md. | 4.925 B3 | 6.05 B3 | 6.60 B3 | | | 7.275 B3 | 8.975 B3 | 9.725 B3 | 6.25 B3 | \$10.15 B3 | \$8.85 B3 | | |
| Worcester, Mass. | | | | | | | | | 6.45 A5 | | | | |
| Trenton, N. J. | | | | | | | | | | | | | |
| MIDDLE WEST | Alton, Ill. | | | | | | | | | 6.35 L1 | | | |
| | Ashland, Ky. | 4.925 A7 | | 6.60 A7 | 6.625 A7 | | | | | | | | |
| | Canton-Massillon, Dover, Ohio | | | 6.60 R3, R1 | | | | | | | | | |
| | Chicago, Joliet, Ill. | 4.925 W8, A1 | | | | | 7.275 U1 | | | 6.15 A5, R3,W8, N4,K2 | | | |
| | Sterling, Ill. | | | | | | | | | 6.25 N4,K2 | | | |
| | Cleveland, Ohio | 4.925 R3, J3 | 6.05 R3, J3 | | 6.625 R3 | | 7.275 R3, J3 | 8.975 R3, J3 | | 6.15 A5 | | | |
| | Detroit, Mich. | 5.025 G3, M2 | 6.15 G3 6.05 M2 | | | | 7.375 G3 | 9.075 G3 | | | | | |
| | Newport, Ky. | 4.925 A1 | 6.05 A1 | | | | | | | | | | |
| | Gary, Ind. Harbor, Indiana | 4.925 U1, I3,Y1 | 6.05 U1, I3,Y1 | 6.60 U1, I3 | 6.625 U1, I3,Y1 | 7.00 U1 | 7.275 U1, Y1,I3 | 8.975 U1, Y1 | | 6.15 Y1 | \$10.05 U1, Y1 | \$8.75 I3, U1,Y1 | 7.50 U1, Y1 |
| | Granite City, Ill. | 5.125 G2 | 6.25 G2 | 6.60 G2 | 6.625 G2 | | | | | | | \$8.85 G2 | 7.60 G2 |
| | Kokomo, Ind. | | | 6.70 C9 | | | | | | 6.25 C9 | | | |
| | Mansfield, Ohio | | 6.05 E2 | | | 7.00 E2 | | | | | | | |
| | Middletown, Ohio | | 6.85 A7 | 6.60 A7 | 6.625 A7 | 7.00 A7 | | | | | | | |
| | Niles, Warren, Ohio Sharon, Pa. | 4.925 R3, N3,S1 | 6.05 R3 | 6.60 R3 | 6.625 N3, S1 | 7.00 N3, S1,R3 | 7.275 R3 | 8.975 S1, R3 | | | | \$8.75 R3 | |
| | Pittsburgh, Pa. Midland, Pa. Butler, Pa. Donora, Pa. Aliquippa, Pa. | 4.925 U1, J3,P6 | 6.05 U1, J3,P6 | 6.60 U1, J3 | 6.625 U1 | | 7.275 U1, J3 | 8.975 U1, J3 | 9.725 U1 | 6.15 A5, J3,P6 | \$10.05 U1, J3 | \$8.75 U1, J3 | 7.50 U1, J3 |
| | Portsmouth, Ohio | 4.925 P7 | 6.05 P7 | | | | | | | 6.15 P7 | | | |
| Weirton, Wheeling, Follansbee, W. Va. | 4.925 W3, W5 | 6.05 W3, F3,W5 | 6.60 W3, W5 | | 7.00 W3, W5 | 7.275 W3 | 8.975 W3 | | | \$10.05 W5, W3 | \$8.75 W5, W3 | 7.50 W5 | |
| Youngstown, Ohio | 4.925 U1, Y1 | 6.05 Y1 | | 6.625 Y1 | | 7.275 Y1 | 8.975 Y1 | | 6.15 Y1 | | | | |
| WEST | Fontana, Cal. | 5.675 K1 | 7.30 K1 | | | | 8.925 K1 | 10.275 K1 | | | \$10.00 K1 | \$9.50 K1 | |
| | Genova, Utah | 5.025 C7 | | | | | | | | | | | |
| | Kansas City, Mo. | | | | | | | | | 6.40 S2 | | | |
| | Los Angeles, Torrance, Cal. | | | | | | | | | 6.95 B2 | | | |
| | Minneapolis, Colo. | | | | | | | | | 6.40 C6 | | | |
| | San Francisco, Niles, Pittsburgh, Cal. | 5.625 C7 | 7.00 C7 | 7.35 C7 | | | | | | 6.95 C7 | \$10.00 C7 | \$9.50 C7 | |
| | Seattle, Wash. | | | | | | | | | | | | |
| SOUTH | Atlanta, Ga. | | | | | | | | | | | | |
| | Fairfield, Ala. Alabama City, Ala. | 4.925 T2, R3 | 6.05 T2, R3 | 6.60 T2, R3 | 6.625 T2 | | | | | 6.15 T2, R3 | \$10.15 T2 | \$8.85 T2 | |
| | Houston, Tex. | | | | | | | | | 6.40 S2 | | | |

IRON AGE

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

STEEL
PRICES

BARS

PLATES

WIRE

Carbon
SteelReinforc-
ingCold
FinishedAlloy
Hot-
rolledAlloy
Cold
DrawnHi Str.
H.R. Low
AlloyCarbon
SteelFloor
Plate

Alloy

Hi Str.
Low
AlloyMfrs.
Bright

Bethlehem, Pa.

Buffalo, N. Y.

Claymont, Del.

Coatesville, Pa.

Conshohocken, Pa.

Harrisburg, Pa.

Milton, Pa.

Hartford, Conn.

Johnstown, Pa.

Fairless, Pa.

Newark, N. J.

Camden, N. J.

Bridgeport, Conn.

Putnam, Conn.

Williamantic, Conn.

Sparrows Pt., Md.

Palmer, Worcester,

Roxbury, Mass.

Spring City, Pa.

Alton, Ill.

Ashland, Newport, Ky.

Canton, Massillon, Ohio

Chicago, Joliet, Waukegan, Ill.

Harvey, Ill.

Cleveland, Ohio

Elyria, Ohio

Detroit, Mich.

Duluth, Minn.

Gary, Ind. Harbor, Crawfordsville, Hammond, Ind.

Granite City, Ill.

Kokomo, Ind.

Sterling, Ill.

Niles, Warren, Ohio

Sharon, Pa.

Owensboro, Ky.

Pittsburgh, Midland, Danora, Aliquippa, Pa.

Portsmouth, Ohio

Weirton, Wheeling, Follansbee, W. Va.

Youngstown, Ohio

Emeryville, Cal.

Fontana, Cal.

Geneva, Utah

Kansas City, Mo.

Los Angeles, Torrance, Cal.

Minneapolis, Colo.

Portland, Ore.

San Francisco, Niles, Pittsburg, Cal.

Seattle, Wash.

Atlanta, Ga.

Fairfield, Ala. City, Birmingham, Ala.

Houston, Ft. Worth, Lone Star, Tex.

6.475 B3

6.475 B3,B3

7.35 B5

6.475 B3,B3

6.475 B3,B3

7.925 B3

5.425 B3

5.425 B3

6.475 B3

6.475 B3

7.75 W10

7.75 P10

7.85 W10

7.80 J3

7.85 B5,C14

7.75 K4

5.625 L1

7.30 R3,R2

6.475 R3,T5

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STEEL PRICES

Key to Steel Producers

With Principal Offices

- A1 Acme Steel Co., Chicago
A2 Alan Wood Steel Co., Conshohocken, Pa.
A3 Allegheny Ludlum Steel Corp., Pittsburgh
A4 American Cladmetals Co., Carnegie, Pa.
A5 American Steel & Wire Div., Cleveland
A6 Angel Nail & Chaplet Co., Cleveland
A7 Armco Steel Corp., Middletown, Ohio
A8 Atlantic Steel Co., Atlanta, Ga.
A9 Acme-Newport Steel Co., Newport, Ky.
B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2 Bethlehem Pacific Coast Steel Corp., San Francisco
B3 Bethlehem Steel Co., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin, Inc., Harvey, Ill.
B6 Brook Plant, Wickwire-Spencer Steel Div., Birdsboro, Pa.
B7 A. M. Byers, Pittsburgh
B8 Braeburn Alloy Steel Corp., Braeburn, Pa.
C1 Calstrip Steel Corp., Los Angeles
C2 Carpenter Steel Co., Reading, Pa.
C3 Central Iron & Steel Co., Harrisburg, Pa.
C4 Claymont Products Dept., Claymont, Del.
C5 Colorado Fuel & Iron Corp., Denver
C6 Columbia Geneva Steel Div., San Francisco
C7 Columbia Steel & Shifting Co., Pittsburgh
C8 Continental Steel Corp., Kokomo, Ind.
C9 Copperweld Steel Co., Pittsburgh, Pa.
C10 Crucible Steel Co. of America, Pittsburgh
C11 Cuyahoga Steel & Wire Co., Cleveland
C12 Compressed Steel Shifting Co., Readville, Mass.
C13 G. O. Carlson, Inc., Thornedale, Pa.
C14 Connors Steel Div., Birmingham
C15 Chester Blast Furnace, Inc., Chester, Pa.
C16 Cold Drawn Steel Plant, Western Automatic Machine Screw Co., Elyria, O.
D1 Detroit Steel Corp., Detroit
D2 Dearborn Div., Sharon Steel Corp.
D3 Driver Harris Co., Harrison, N. J.
D4 Dickson Weatherproof Nail Co., Evanston, Ill.
E1 Eastern Stainless Steel Corp., Baltimore
E2 Empire Steel Co., Mansfield, O.
F1 Firth Sterling, Inc., McKeesport, Pa.
F2 Fitzsimons Steel Corp., Youngstown
F3 Follansbee Steel Corp., Follansbee, W. Va.

- G2 Granite City Steel Co., Granite City, Ill.
G3 Great Lakes Steel Corp., Detroit
G4 Greer Steel Co., Dover, O.
G5 Green River Steel Corp., Owenboro, Ky.
H1 Hanna Furnace Corp., Detroit
I2 Ingersoll Steel Div., Chicago
I3 Inland Steel Co., Chicago
I4 Interlake Iron Corp., Cleveland
J1 Jackson Iron & Steel Co., Jackson, O.
J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago
J5 Judson Steel Corp., Emeryville, Calif.
K1 Kaiser Steel Corp., Fontana, Cal.
K2 Keystone Steel & Wire Co., Peoria
K3 Koppers Co., Granite City, Ill.
K4 Keystone Drawn Steel Co., Spring City, Pa.
L1 Laclede Steel Co., St. Louis
L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.
M1 Mahoning Valley Steel Co., Niles, O.
M2 McLouth Steel Corp., Detroit
M3 Mercer Tube & Mfg. Co., Sharon, Pa.
M4 Mid States Steel & Wire Co., Crawfordsville, Ind.
M6 Mystic Iron Works, Everett, Mass.
M7 Milton Steel Products Div., Milton, Pa.
M8 Mill Strip Products Co., Evanston, Ill.
N1 National Supply Co., Pittsburgh
N2 National Tube Div., Pittsburgh
N3 Niles Rolling Mill Div., Niles, O.
N4 Northwestern Steel & Wire Co., Sterling, Ill.
N6 Northwest Steel Rolling Mills, Seattle
N7 Newman Crosby Steel Co., Pawtucket, R. I.
N8 Carpenter Steel of New England, Inc., Bridgeport, Conn.
N9 Nelson Steel & Wire Co.
O1 Oliver Iron & Steel Co., Pittsburgh
O2 Oregon Steel Mills, Portland
P1 Page Steel & Wire Div., Monaca, Pa.
P2 Phoenix Iron & Steel Co., Phoenixville, Pa.
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P5 Pittsburgh Screw & Bolt Co., Pittsburgh
P6 Pittsburgh Steel Co., Pittsburgh
P7 Portsmouth Div., Detroit Steel Corp., Detroit

- P8 Plymouth Steel Co., Detroit
P9 Pacific States Steel Co., Niles, Cal.
P10 Precision Drawn Steel Co., Camden, N. J.
P11 Production Steel Strip Corp., Detroit
P13 Phoenix Mfg. Co., Joliet, Ill.
P14 Pacific Tube Co.
P15 Philadelphia Steel and Wire Corp.
R1 Reeves Steel & Mfg. Co., Dover, O.
R2 Reliance Div., Eaton Mfg. Co., Massillon, O.
R3 Republic Steel Corp., Cleveland
R4 Roebbing Sons Co., John A., Trenton, N. J.
R5 J. & L. Steel Co., Stainless Div.
R6 Rodney Metals, Inc., New Bedford, Mass.
R7 Rome Strip Steel Co., Rome, N. Y.
S1 Sharon Steel Corp., Sharon, Pa.
S2 Sheffield Steel Div., Kansas City
S3 Shenango Furnace Co., Pittsburgh
S4 Simonds Saw and Steel Co., Fitchburg, Mass.
S5 Sweet's Steel Co., Williamsport, Pa.
S6 Standard Forging Corp., Chicago
S7 Stanley Works, New Britain, Conn.
S8 Superior Drawn Steel Co., Monaca, Pa.
S9 Superior Steel Div. of Copperweld Steel Co., Carnegie, Pa.
S10 Seneca Steel Service, Buffalo
S11 Southern Electric Steel Co., Birmingham
T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
T2 Tennessee Coal & Iron Div., Fairfield
T3 Tennessee Products & Chem. Corp., Nashville
T4 Thomas Strip Div., Warren, O.
T5 Timken Steel & Tube Div., Canton, O.
T7 Texas Steel Co., Fort Worth
T8 Thompson Wire Co., Boston
U1 United States Steel Corp., Pittsburgh
U2 Universal-Cyclopa Steel Corp., Bridgeville, Pa.
U3 Ulbrich Stainless Steels, Wallingford, Conn.
U4 U. S. Pipe & Foundry Co., Birmingham
W1 Wallingford Steel Co., Wallingford, Conn.
W2 Washington Steel Corp., Washington, Pa.
W3 Weirton Steel Co., Weirton, W. Va.
W4 Wheatland Tube Co., Wheatland, Pa.
W5 Wheeling Steel Corp., Wheeling, W. Va.
W6 Wickwire Spencer Steel Div., Buffalo
W7 Wilson Steel & Wire Co., Chicago
W8 Wisconsin Steel Div., S. Chicago, Ill.
W9 Woodward Iron Co., Woodward, Ala.
W10 Wyckoff Steel Co., Pittsburgh
W12 Wallace Barnes Steel Div., Bristol, Conn.
Y1 Youngstown Sheet & Tube Co., Youngstown, O.

PIPE AND TUBING

Base discounts (per) f.o.b. mills. Base price about \$200 per net ton.

| STANDARD T. & C. | BUTTWELD | | | | | | | | | | | | SEAMLESS | | | | | | | | | | | |
|--------------------------------|----------|-------|---------|-------|-------|--------|-----------|--------|-----------|--------|-------|--------|-------------|--------|-------|--------|-----------|--------|-------|--------|-------------|--------|-------|-------|
| | 1/2 in. | | 3/4 in. | | 1 in. | | 1 1/4 in. | | 1 1/2 in. | | 2 in. | | 2 1/2-3 in. | | 2 in. | | 2 1/2 in. | | 3 in. | | 3 1/2-4 in. | | | |
| | Bk. | Gal. | Bk. | Gal. | Bk. | Gal. | Bk. | Gal. | Bk. | Gal. | Bk. | Gal. | Bk. | Gal. | Bk. | Gal. | Bk. | Gal. | Bk. | Gal. | Bk. | Gal. | Bk. | Gal. |
| Sparrows Pt. B3... | 3.25 | +12.0 | 6.25 | +8.0 | 9.75 | +3.50 | 12.25 | +2.75 | 12.75 | +1.75 | 13.25 | +1.25 | 14.75 | +1.50 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Youngstown R3... | 5.25 | +10.0 | 8.25 | +6.0 | 11.75 | +1.50 | 14.25 | +0.75 | 14.75 | 0.25 | 15.25 | 0.75 | 16.75 | 0.50 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Fontana K1... | +5.25 | +23.5 | +5.25 | +19.5 | +1.75 | +15.00 | 0.75 | +14.25 | 1.25 | +13.25 | 1.75 | +12.75 | 3.25 | +13.00 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Pittsburgh J3... | 5.25 | +10.0 | 8.25 | +6.0 | 11.75 | +1.50 | 14.25 | +0.75 | 14.75 | 0.25 | 15.25 | 0.75 | 16.75 | 0.50 | *9.25 | +24.25 | *2.75 | +19.50 | *0.25 | +17.0 | 1.25 | +15.50 | ..... | ..... |
| Alton, Ill. L1... | 3.25 | +12.0 | 6.25 | +8.0 | 9.75 | +3.50 | 12.25 | +2.75 | 12.75 | +1.75 | 13.25 | +1.25 | 14.75 | +1.50 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Sharon M5... | 5.25 | +10.0 | 8.25 | +6.0 | 11.75 | +1.50 | 14.25 | +0.75 | 14.75 | 0.25 | 15.25 | 0.75 | 16.75 | 0.50 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Fairless N2... | 3.25 | +12.0 | 6.25 | +8.0 | 9.75 | +3.50 | 12.25 | +2.75 | 12.75 | +1.75 | 13.25 | +1.25 | 14.75 | +1.50 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Pittsburgh N1... | 5.25 | +10.0 | 8.25 | +6.0 | 11.75 | +1.50 | 14.25 | +0.75 | 14.75 | 0.25 | 15.25 | 0.75 | 16.75 | 0.50 | *9.25 | +24.25 | *2.75 | +19.50 | *0.25 | +17.0 | 1.25 | +15.50 | ..... | ..... |
| Wheeling W5... | 5.25 | +10.0 | 8.25 | +6.0 | 11.75 | +1.50 | 14.25 | +0.75 | 14.75 | 0.25 | 15.25 | 0.75 | 16.75 | 0.50 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Wheatland W4... | 5.25 | +10.0 | 8.25 | +6.0 | 11.75 | +1.50 | 14.25 | +0.75 | 14.75 | 0.25 | 15.25 | 0.75 | 16.75 | 0.50 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Youngstown Y1... | 5.25 | +10.0 | 8.25 | +6.0 | 11.75 | +1.50 | 14.25 | +0.75 | 14.75 | 0.25 | 15.25 | 0.75 | 16.75 | 0.50 | *9.25 | +24.25 | *2.75 | +19.50 | *0.25 | +17.0 | 1.25 | +15.50 | ..... | ..... |
| Indiana Harbor Y1... | 4.25 | +11.0 | 7.25 | +7.0 | 10.75 | +2.50 | 13.25 | +1.75 | 13.25 | +0.75 | 14.25 | +0.25 | 15.25 | +1.00 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Lorain N2... | 5.25 | +10.0 | 8.25 | +6.0 | 11.75 | +1.50 | 14.25 | +0.75 | 14.75 | 0.25 | 15.25 | 0.75 | 16.75 | 0.50 | *9.25 | +24.25 | *2.75 | +19.50 | *0.25 | +17.0 | 1.25 | +15.50 | ..... | ..... |
| EXTRA STRONG PLAIN ENDS | | | | | | | | | | | | | | | | | | | | | | | | |
| Sparrows Pt. B3... | 7.75 | +6.0 | 11.75 | +2.0 | 14.75 | 2.50 | 15.25 | 1.25 | 15.75 | 2.25 | 16.25 | 2.75 | 16.75 | 1.50 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Youngstown R3... | 9.75 | +4.0 | 13.75 | list | 16.75 | 4.50 | 17.25 | 3.25 | 17.75 | 4.25 | 18.25 | 4.75 | 18.75 | 3.50 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Fairless N2... | 7.75 | +6.0 | 11.75 | +2.0 | 14.75 | 2.50 | 15.25 | 1.25 | 15.75 | 2.25 | 16.25 | 2.75 | 16.75 | 1.50 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Fontana K1... | +3.75 | ..... | 0.25 | ..... | 3.25 | ..... | 3.75 | ..... | 4.25 | ..... | 4.75 | ..... | 5.25 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Pittsburgh J3... | 9.75 | +4.0 | 13.75 | list | 16.75 | 4.50 | 17.25 | 3.25 | 17.75 | 4.25 | 18.25 | 4.75 | 18.75 | 3.50 | *7.75 | +21.75 | *0.25 | +16.0 | 2.25 | +13.50 | 7.25 | +8.50 | ..... | ..... |
| Alton, Ill. L1... | 7.75 | +6.0 | 11.75 | +2.0 | 14.75 | 2.50 | 15.25 | 1.25 | 15.75 | 2.25 | 16.25 | 2.75 | 16.75 | 1.50 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Sharon M5... | 9.75 | +4.0 | 13.75 | list | 16.75 | 4.50 | 17.25 | 3.25 | 17.75 | 4.25 | 18.25 | 4.75 | 18.75 | 3.50 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Pittsburgh N1... | 9.75 | +4.0 | 13.75 | list | 16.75 | 4.50 | 17.25 | 3.25 | 17.75 | 4.25 | 18.25 | 4.75 | 18.75 | 3.50 | *7.75 | +21.75 | *0.25 | +16.0 | 2.25 | +13.50 | 7.25 | +8.50 | ..... | ..... |
| Wheeling W5... | 9.75 | +4.0 | 13.75 | list | 16.75 | 4.50 | 17.25 | 3.25 | 17.75 | 4.25 | 18.25 | 4.75 | 18.75 | 3.50 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Wheatland W4... | 9.75 | +4.0 | 13.75 | list | 16.75 | 4.50 | 17.25 | 3.25 | 17.75 | 4.25 | 18.25 | 4.75 | 18.75 | 3.50 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Youngstown Y1... | 9.75 | +4.0 | 13.75 | list | 16.75 | 4.50 | 17.25 | 3.25 | 17.75 | 4.25 | 18.25 | 4.75 | 18.75 | 3.50 | *7.75 | +21.75 | *0.25 | +16.0 | 2.25 | +13.50 | 7.25 | +8.50 | ..... | ..... |
| Indiana Harbor Y1... | 8.75 | +5.0 | 12.75 | +1.0 | 15.75 | 3.50 | 16.25 | 2.25 | 16.75 | 3.25 | 17.25 | 3.75 | 17.75 | 2.50 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Lorain N2... | 9.75 | +4.0 | 13.75 | list | 16.75 | 4.50 | 17.25 | 3.25 | 17.75 | 4.25 | 18.25 | 4.75 | 18.75 | 3.50 | *7.75 | +21.75 | *0.25 | +16.0 | 2.25 | +13.50 | 7.25 | +8.50 | ..... | ..... |

Threads only, butt weld and seamless 2 1/2 pt. higher discount. Plain ends, butt weld and seamless, 3-in. and under, 5 1/2 pt. higher discount. Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb. East St. Louis. For each 2¢ change in zinc, discounts vary as follows: 1/2, 3/4 and 1-in., 2 pt.; 1 1/4, 1 1/2 and 2-in., 1 1/2 pt.; 2 1/2 and 3-in., 1 pt., e.g., zinc price range of over 13¢ to 15¢ would lower discounts on 2 1/2 and 3-in. pipe by 2 points; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis zinc price now 10¢ per lb.

(Effective April 21, 1958)

BOLTS, NUTS, RIVETS, SCREWS

(Base discount, f.o.b. mill)

Pot. Discounts

| Machine and Carriage Bolts | Full Container Price | 30 Containers | 20,000 Lb. | 40,000 Lb. |
|--|----------------------|---------------|------------|------------|
| 1/2" and smaller x 6" and shorter | 49 | 54 | 58 | 57 |
| 3/4" thru 1" x longer than 6" | 35 | 40 | 43 | 45 |
| Roll thread carriage bolts 1/2" & smaller x 6" and shorter | 49 | 54 | 58 | 57 |
| Lag, all diam. x 6" & shorter | 40 | 54 | 58 | 57 |
| Lag, all diam. longer than 6 in. | 39 | 44 1/2 | 47 | 48 1/2 |
| Flow bolts, 1/2" and smaller x 6" and shorter | 49 | 54 | 58 | 57 |

(Add 25 pct for broken case quantities)

| Nuts, Hex, HP reg. & hvy. | Full case or Keg price |
|----------------------------------|------------------------|
| 1/2 in. or smaller | 60 1/2 |
| 3/4 in. to 1 in. inclusive | 55 1/2 |
| 1 1/4 in. to 1 1/2 in. inclusive | 58 1/2 |
| 1 3/4 in. and larger | 53 1/2 |

C. P. Hex, reg. & hvy.

| | |
|--------------------------------|--------|
| 1/2 in. and smaller | 60 1/2 |
| 3/4 in. to 1 1/4 in. inclusive | 55 1/2 |
| 1 1/2 in. and larger | 53 1/2 |

Hot Galv. Hex Nuts (All Types)

| | |
|---------------------|--------|
| 1/2 in. and smaller | 46 1/2 |
|---------------------|--------|

Semi-finished Hex Nuts

| | |
|--------------------------------|--------|
| 1/2 in. or smaller | 60 1/2 |
| 3/4 in. to 1 1/4 in. inclusive | 55 1/2 |
| 1 1/2 in. and larger | 53 1/2 |

(Add 25 pct for broken case or keg quantities)

Finished

| | |
|---------------------|----|
| 1/2 in. and smaller | 63 |
|---------------------|----|

Rivets

| | Base per 100 lb | Pct. Off List |
|----------------------|-----------------|---------------|
| 1/2 in. and larger | \$12.25 | |
| 7/16 in. and smaller | 19 | |

Cap Screws

Discount (Packages)

Full Finished H. C. Heat Treat

| New std. hex head, packaged | | |
|--|----|-----|
| 1/2" diam. and smaller x 6" and shorter | 40 | 36 |
| 3/4", 1/2" and 1" diam. x 6" and shorter | 22 | 3 |
| 1/2" diam. and smaller x longer than 6" | 8 | +13 |
| 3/4", 1/2" and 1" diam. x longer than 6" | +6 | +32 |
| 1/4" through 1/2" dia. x 6" and shorter | 58 | 49 |
| 3/4" through 1" dia. x 6" and shorter | 45 | 33 |
| Minimum quantity—1/4" through 3/4" diam., 15,000 pieces; 1/2" through 1" diam., 5,000 pieces; 3/4" through 1" diam., 2,000 pieces. | | |

Machine Screws & Stove Bolts

Discount

| Plain Finish | Quantity | Machine Screws | Stove Bolts |
|--------------|----------|----------------|-------------|
| Cartons | 60 | 60 | 60 |
| Bulk | | | |

| | | | |
|--------------------------|-----------------|----|----|
| To 1/4" diam. incl. | 25,000 and over | 60 | .. |
| 5/16 to 1/2" diam. incl. | 15,000-200,000 | 60 | .. |

Machine Screws & Stove Bolt Nuts

Discount

| In Cartons | Quantity | Hex | Square |
|----------------------|-----------------|-----|--------|
| | | 16 | 19 |
| In Bulk | | | |
| 1/2" diam. & smaller | 25,000 and over | 14 | 16 |

CAST IRON WATER PIPE INDEX

| | |
|---------------|-------|
| Birmingham | 125.8 |
| New York | 138.7 |
| Chicago | 140.9 |
| San Francisco | 148.6 |

Dec. 1955, value, Class B or heavier

5 in. or larger, bell and spigot pipe. Ex-

planation: p. 57, Sept. 1, 1955, issue.

Source: U. S. Pipe and Foundry Co.

ELECTROPLATING SUPPLIES

Anodes

| (Cents per lb, fct allowed in quantity) | |
|---|--------|
| Copper | |
| Rolled elliptical, 18 in. or longer, 5000 lb lots | 40.00 |
| Electrodeposited | 31.25 |
| Brass, 80-20, ball anodes, 2000 lb | 44.00 |
| Zinc, ball anodes, 2000 lb lots | 16.50 |
| (for elliptical add 1¢ per lb) | |
| Nickel, 99 pct plus, rolled carbon, 5000 lb | 1.0225 |
| (Rolled depolarized add 3¢ per lb) | |
| Cadmium | 1.55 |
| Tin, ball anodes \$1.13 per lb (approx.) | |

Chemicals

| (Cents per lb, f.o.b. shipping point) | |
|--|-------|
| Copper cyanide, 100 lb drum | 68.70 |
| Copper sulphate, 100 lb bags, per cwt. | 22.15 |
| Nickel salts, single, 100 lb bags | 40.50 |
| Nickel chloride, freight allowed, 300 lb | 48.50 |
| Sodium cyanide, domestic, f.o.b. N. Y., 200 lb drums | 24.05 |
| (Philadelphia price 24.50) | |
| Zinc cyanide, 100 lb | 60.75 |
| Potassium cyanide, 100 lb drum | 48.00 |
| Chronic acid, flake type, 10,000 lb or more | 31.00 |

METAL POWDERS

Per pound, f.o.b. shipping point, in ton

lots for minus 100 mesh

| | |
|--|---------------------------|
| Swedish sponge iron, del. East of Miss. River, ocean bags, 23,000 lb. and over | 10.5¢ |
| F.O.B. Riverton or Camden, New Jersey, west of Miss. River | 9.5¢ |
| Domestic sponge iron, 95+ % Fe, 23,000 lb. and over del'd East of Miss. River | 10.5¢ |
| F.O.B. Riverton, New Jersey, West of Miss. River | 9.5¢ |
| Canadian sponge iron, del'd in East, carloads | 10.5¢ |
| Electrolytic iron, annealed, imported 99.5+ % Fe | 27.5¢ |
| domestic 99.5+ % Fe | 36.5¢ |
| Electrolytic iron, unannealed minus 325 mesh, 99+ % Fe | 57.0¢ |
| Electrolytic iron melting stock, 99.84% pure | 27.0¢ |
| Carbonyl iron size 3 to 20 micron, 98%, 99.8+ % Fe | \$8.0¢ to \$2.85 |
| Aluminum, freight allowed | 38.00¢ |
| Brass, 10 ton lots | \$1.1¢ to 47.1¢ |
| Copper, electrolytic | 41.50¢ |
| Copper, reduced | 40.3¢ to 18.8¢ |
| Cadmium, 100-199 lb. 95% plus metal value | |
| Chromium, electrolytic, 99.85% min. Fe. 03 max. Del'd | \$5.00 |
| Lead | \$21.50¢ lb. f.o.b. plant |
| Manganese f.o.b. Extron, Pa. | 46.0¢ |
| Molybdenum, 99% | \$3.60 to \$3.95 |
| Nickel, chemically precipitated | \$1.00 |
| Nickel, unannealed | \$1.00 |
| Nickel, annealed | \$1.06 |
| Nickel, spherical, unannealed | \$1.13 |
| Silicon | 43.50¢ |
| Solder powder | 13¢ plus met. value |
| Stainless steel, 302 | \$1.02 |
| Stainless steel, 316 | \$1.30 |
| Tin | 14.00¢ plus metal value |
| Tungsten, 99% (65 mesh) \$3.15 (nominal) | |
| Zinc, 5000 lb & over | 17.5¢ to 30.7¢ |

WARE-HOUSES

Metropolitan Price, dollars per 100 lb.

| WARE-HOUSES | | | Sheets | | Strip | Plates | Shapes | Bars | | Alloy Bars | | | |
|---------------|----------------------|----------------------------|-----------------------|-----------------------|------------|--------|--------------------|-----------------------|---------------|---------------------------|--------------------------|---------------------------|--------------------------|
| Cities | City Delivery Charge | Hot-Rolled (16 sq. & hvy.) | Cold-Rolled (15 gage) | Galvanized (16 gage)† | Hot-Rolled | | Standard Structure | Hot-Rolled (merchant) | Cold-Finished | Hot-Rolled 4615 As rolled | Hot-Rolled 4615 Annealed | Cold-Drawn 4615 As rolled | Cold-Drawn 4615 Annealed |
| Atlanta | | 8.59 | 9.87 | 10.13 | 8.64 | 8.97 | 9.05 | 9.01 | 10.68 | | | | |
| Baltimore | \$3.10 | 8.38 | 8.98 | 9.78 | 8.86 | 8.76 | 9.29 | 9.16 | 11.44 | 16.18 | 15.18 | 19.73 | 18.98 |
| Birmingham | .15 | 8.18 | 9.45 | 10.15 | 8.23 | 8.56 | 8.64 | 8.60 | 10.57 | | | | |
| Boston | .10 | 9.48 | 10.54 | 11.55 | 9.52 | 9.82 | 9.73 | 9.63 | 13.00 | 16.38 | 15.38 | 19.93 | 19.18 |
| Buffalo | .15 | 8.40 | 9.15 | 11.22 | 8.45 | 9.05 | 9.05 | 8.95 | 11.05 | 16.34 | 15.15 | 19.01 | 18.95 |
| Chicago | .15 | 8.35 | 9.60 | 10.25 | 8.38 | 8.71 | 8.79 | 8.75 | 8.95 | 15.00 | 14.00 | 19.35 | 18.60 |
| Cincinnati | .15 | 8.49 | 9.65 | 10.25 | 8.69 | 9.08 | 9.33 | 9.07 | 9.46 | 15.61 | 15.11 | 18.96 | 18.91 |
| Cleveland | .15 | 8.33 | 9.60 | 10.35 | 8.48 | 8.94 | 9.16 | 8.84 | 10.95 | 15.80 | 14.89 | 19.29 | 18.69 |
| Denver | .20 | 9.70 | 11.30 | 12.49 | 9.80 | 9.70 | 9.80 | 9.98 | 10.65 | | | | 17.60 |
| Detroit | .15 | 8.58 | 9.85 | 10.60 | 8.73 | 9.06 | 9.33 | 9.05 | 9.30 | 15.46 | 15.06 | 18.81 | 18.86 |
| Houston | | 7.10 | 8.05 | | 7.25 | 7.70 | 7.25 | 7.20 | 11.10 | 16.20 | 15.25 | 19.65 | 18.95 |
| Kansas City | .20 | 9.02 | 10.27 | 10.82 | 9.05 | 9.38 | 9.46 | 9.42 | 9.67 | 20.62 | 15.47 | 20.62 | 19.27 |
| Los Angeles | .10 | 8.60** | 10.85 | 11.75 | 8.65 | 8.65 | 8.70 | 8.80 | 13.35* | 17.05 | 16.10 | 21.05 | 20.35 |
| Memphis | .15 | 8.55 | 9.80 | | 8.60 | 8.93 | 9.01 | 8.97 | 12.11* | | | | |
| Milwaukee | .15 | 8.48 | 9.73 | 10.38 | 8.51 | 8.84 | 9.00 | 8.88 | 9.18 | 15.93 | 14.93 | 19.48 | 18.73 |
| New York | .10 | 8.97 | 10.23 | 10.66 | 9.41 | 9.53 | 9.45 | 9.67 | 12.66* | 16.19 | 15.19 | 19.74 | 18.90 |
| Norfolk | .20 | 8.20 | | | 8.90 | 8.65 | 9.20 | 8.90 | 10.70 | | | | |
| Philadelphia | .10 | 8.10 | 9.00 | 10.82 | 8.79 | 8.87 | 8.60 | 8.75 | 11.61* | 16.11 | 15.11 | 19.66 | 18.91 |
| Pittsburgh | .15 | 8.33 | 9.60 | 10.60 | 8.48 | 8.71 | 8.79 | 8.75 | 10.95* | 15.80 | 14.80 | 19.35 | 18.60 |
| Portland | | 10.00† | 11.75‡ | 13.30‡ | 11.95‡ | 10.10‡ | 11.10‡ | 9.85† | 11.34* | 18.50 | 17.45 | 20.75 | 20.25 |
| San Francisco | .10 | 9.45 | 10.85 | 11.10 | 9.55 | 9.70 | 9.60 | 9.80 | 13.10 | 17.05 | 16.16 | 21.05 | 20.35 |
| Seattle | | 9.95 | 11.15 | 12.20 | 10.00 | 9.70 | 9.80 | 10.10 | 14.05 | 17.15 | 16.35 | 20.65 | 20.15 |
| Spokane | .15 | 10.10 | 11.30 | 12.15 | 10.15 | 9.85 | 9.95 | 10.25 | 14.20 | | 17.35 | 21.55 | 21.05 |
| St. Louis | .15 | 8.69 | 9.94 | 10.61 | 8.74 | 9.08 | 9.25 | 9.12 | 9.56 | 16.16 | 15.16 | 19.71 | 18.96 |
| St. Paul | .15 | 8.94 | 10.19 | 10.86 | 8.99 | 9.45 | 9.53 | 9.37 | 9.81 | | 15.41 | | 19.21 |

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 4999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may be combined with each other for quantity. *All sizes except 18 and 16 gage. †104 zinc. ‡Deduct for country delivery. *C1018—1 in. rounds. †10 ga. x 26" x 120". ‡20 ga. x 36" x 120". ‡26 ga. x 30" x 96". ‡1/4" x 1" in lots of 1000 to 9999; ‡sheared plate 1/4" x 84" in lots of 1000 to 9999; ‡3" x 5.70" in lots of 1000 to 9999; ‡M-1020—1-in. rounds in lots of 1000 to 9999.

TOOL STEEL

F.o.b. mill

| W | Cr | V | Mo | Co | per lb | SAE |
|---|----|-----|----|----|---------|----------|
| 18 | 4 | 1 | — | — | \$1.795 | T-1 |
| 18 | 4 | 1 | — | 5 | 2.50 | T-4 |
| 18 | 4 | 2 | — | — | 1.96 | T-2 |
| 1.5 | 4 | 1.5 | 8 | — | 1.155 | M-1 |
| 6 | 4 | 2 | 6 | — | 1.545 | M-3 |
| 6 | 4 | 3 | 5 | — | 1.30 | M-2 |
| High-carbon chromium | | | | | | D-3, D-5 |
| Oil hardened manganese | | | | | | O-2 |
| Special carbon | | | | | | W-1 |
| Extra carbon | | | | | | W-1 |
| Regular carbon | | | | | | W-1 |
| Warehouse prices on and east of Mississippi are 4¢ per lb higher. West of Mississippi, 6¢ higher. | | | | | | |

CLAD STEEL

Base prices, cents per lb. f.o.b.

| | Plate (A3, J2, L4, C9) | | | Sheet (I2) |
|----------|------------------------|--------|--------|------------|
| Cladding | 10 pct | 15 pct | 20 pct | 20 pct |
| 302 | | | | 37.50 |
| 304 | 37.95 | 42.25 | 46.70 | 48.00 |
| 316 | 44.40 | 49.50 | 54.50 | 58.75 |
| 321 | 40.05 | 44.60 | 49.30 | 47.25 |
| 347 | 42.40 | 47.55 | 52.80 | 57.00 |
| 405 | 29.85 | 33.35 | 36.85 | |
| 410 | 29.55 | 33.10 | 36.70 | |
| 430 | 29.00 | 33.55 | 37.25 | |

CR Strip (S9) Copper, 10 pct, 2 sides, 38.75; 1 side, 33.10.

RAILS, TRACK SUPPLIES

| F.o.b. Mill Cents Per Lb | No. 1 Std. Rails | Light Rails | Joint Bars | Track Spikes | Screw Spikes | Tie Plates | Track Bolts Unthreaded |
|-----------------------------|---------------------|-------------|------------|--------------|--------------|------------|---------------------------|
| Bessemer U1 | 5.525 | 6.50 | 6.975 | | | | 14.75 |
| Cleveland R3 | | | | 9.75 | | | |
| So. Chicago R3 | | | | | | | |
| Ensley T2 | 5.525 | 6.50 | 6.975 | | | | 6.60 |
| Fairfield T2 | | | | | | | 6.60 |
| Gary U1 | 5.525 | 6.50 | 6.975 | | | | 6.60 |
| Huntington C16 | | | | | | | |
| Ind. Harbor I3 | 5.525 | 6.50 | 6.975 | 9.75 | | | 6.60 |
| Ind. Harbor Y1 | | | | | | | |
| Johnstown B3 | 6.50 | | | | | | |
| Joint U1 | | | | 6.975 | | | 14.75 |
| Kansas City S2 | | | | 9.75 | | | 14.75 |
| Lackawanna B3 | 5.525 | 6.50 | 6.975 | | | | 6.60 |
| Lebanon B3 | | | | 6.975 | 14.50 | | 14.75 |
| Minnequa C6 | 5.525 | 7.00 | 6.975 | 9.75 | | | 6.60 |
| Pittsburgh P5 | | | | | | | 14.75 |
| Pittsburgh J3 | | | | 9.75 | | | 15.75 |
| Seattle B2 | 5.525 | | | 10.25 | | | 6.60 |
| Steelton B3 | | | | 9.75 | | | 6.60 |
| Struthers Y1 | | | | | | | 6.75 |
| Terrace C7 | | | | | | | |
| Williamsport S5 | 6.50 | | | | | | |
| Youngstown R3 | | | | 9.75 | | | |

COKE

Furnace, beehive (f.o.b.) Net-Ton
Connellsville, Pa. \$15.00 to \$15.75
Foundry, beehive (f.o.b.) \$17.50 to \$19.00

| | |
|---------------------------|---------|
| Foundry oven coke | |
| Buffalo, del'd | \$31.75 |
| Detroit, f.o.b. | 30.50 |
| New England, del'd | 31.55 |
| Kearney, N. J., f.o.b. | 29.75 |
| Philadelphia, f.o.b. | 29.50 |
| Swedeland, Pa., f.o.b. | 29.50 |
| Painesville, Ohio, f.o.b. | 30.50 |
| Erie, Pa., f.o.b. | 30.50 |
| Cleveland, del'd | 32.65 |
| Cincinnati, del'd | 31.84 |
| St. Paul, f.o.b. | 29.75 |
| St. Louis, f.o.b. | 31.50 |
| Birmingham, f.o.b. | 28.85 |
| Milwaukee, f.o.b. | 30.50 |
| Neville, Ia., Pa. | 29.25 |

LAKE SUPERIOR ORES

51.50% Fe natural content, delivered lower Lake ports. Prices for 1958 season. Freight changes for seller's account.

| | |
|------------------------|---------|
| Openhearth lump | \$12.70 |
| Old range, bessemer | 11.85 |
| Old range, nonbessemer | 11.70 |
| Mesabi, bessemer | 11.60 |
| Mesabi, nonbessemer | 11.45 |
| High phosphorus | 11.45 |

ELECTRICAL SHEETS

| 22-Gage | Hot-Rolled | Cold-Reduced (Coiled or Cut Length) | |
|-----------------------------|-------------------|--|--------------------|
| F.o.b. Mill Cents Per Lb | (Cut Lengths)* | Semi- Processed | Fully Processed |
| Field | | 9.625 | |
| Armature | 11.10 | 10.85 | 11.35 |
| Elect. | 11.80 | 11.55 | 12.05 |
| Special Motor | | 12.10 | |
| Motor | 12.90 | 12.65 | 13.15 |
| Dynamo | 13.95 | 13.70 | 14.20 |
| Trans. 72 | 15.00 | 14.75 | 15.25 |
| Trans. 65 | 15.55 | | |
| Grain Oriented | | | |
| Trans. 58 | 16.05 | Trans. 66 | 20.20 |
| Trans. 52 | 17.10 | Trans. 80 | 19.20 |
| | | Trans. 73 | 19.70 |

Producing points: Beech Bottom (W5); Drackenridge (A3); Granite City (G2); Indiana Harbor (I3); Mansfield (E2); Newport, Ky. (A9); Niles, O. (N3); Vandergrift (U1); Warren, O. (R3); Zanesville, Butler (A7).

ELECTRODES

Cents per lb. f.o.b. plant, threaded, with nipples, unboxed.

| GRAPHITE | | | CARBON* | | |
|----------------|-----------------|-------|----------------|-----------------|-------|
| Diam. (In.) | Length (In.) | Price | Diam. (In.) | Length (In.) | Price |
| 24 | 84 | 26.00 | 40 | 100, 110 | 10.70 |
| 20 | 72 | 25.25 | 35 | 110 | 10.70 |
| 18 | 72 | 25.75 | 30 | 110 | 10.65 |
| 16 | 72 | 25.75 | 24 | 72 to 84 | 11.25 |
| 12 | 72 | 26.25 | 20 | 90 | 11.00 |
| 10 | 60 | 28.00 | 17 | 72 | 11.40 |
| 10 | 48 | 28.50 | 14 | 72 | 11.85 |
| 7 | 60 | 28.25 | 12 | 60 | 12.95 |
| 6 | 48 | 31.50 | 10 | 60 | 13.00 |
| 4 | 48 | 35.00 | 8 | 60 | 13.30 |
| 3 | 48 | 37.00 | | | |
| 2 1/2 | 30 | 39.25 | | | |
| 2 | 24 | 60.75 | | | |

* Prices shown cover carbon nipples.

REFRACTORIES

Fire Clay Brick

Carloads per 1000
First quality, Ill., Ky., Md., Mo., Ohio, Pa.
(except Salina, Pa., add \$5.00) \$135.00
No. 1 Ohio 120.00
Sec. Quality, Pa., Md., Ky., Mo., Ill. 120.00
No. 2 Ohio 103.00
Ground fire clay, net ton, bulk
(except Salina, Pa., add \$2.00) 21.50

Silica Brick

Mt. Union, Pa., Ensley, Ala. \$150.00
Childs, Hays, Pa. 155.00
Chicago District 160.00
Western Utah 175.00
California 180.00
Super Duty

Hays, Pa., Athens, Tex., Windham, Warren, O., Morrisville 157.00-160.00
Silica cement, net ton, bulk, Latrobe 28.50
Silica cement, net ton, bulk, Chicago 25.50
Silica cement, net ton, bulk, Ensley, Ala. 26.50
Silica cement, net ton, bulk, Mt. Union 24.50
Silica cement, net ton, bulk, Utah and Calif. 37.00

Standard chemically bonded, Balt. \$105.00
Standard chemically bonded, Curt-ner Calif. 115.00
Burned, Balt. 99.00

Magnesite Brick

Standard Baltimore \$131.00
Chemically bonded, Baltimore 116.00

Grain Magnesite

St. % to 1/2-in. grains
Domestic, f.o.b. Baltimore in bulk \$73.00
Domestic, f.o.b. Chewah, Wash., 46.00
Luning, Nev. 52.00-54.00
In sacks

Dead Burned Dolomite

Per net ton
F.o.b. bulk, producing points in:
Pa., W. Va., Ohio 16.75
Midwest 17.00
Missouri Valley 15.00

MERCHANT WIRE PRODUCTS

| F.o.b. Mill | Col | Col | Col | Col | Col | e/lb. | e/lb. |
|---------------------|------|-----|-----|-------|------|---------|-------|
| Alabama City R3 | 173 | 187 | 212 | 193 | 8.65 | 9.20 | |
| Altoona J3** | 173 | 190 | 214 | 198 | 8.65 | 9.325 | |
| Atlanta A8** | 175 | 192 | 214 | 198 | 8.75 | 9.425 | |
| Bartonsville K2** | 175 | 192 | 214 | 198 | 8.75 | 9.425** | |
| Buffalo H6 | | | | | 8.65 | 9.85* | |
| Chicago N4** | 173 | 190 | 212 | 196 | 8.65 | 9.325 | |
| Cleveland A6 | | | | | 8.65 | | |
| Cleveland A5 | | | | | 8.65 | | |
| Crawfords M4** | 175 | 192 | 214 | 198 | 8.75 | 9.425 | |
| Donora, Pa. A5 | 173 | 187 | 212 | 193 | 8.65 | 9.20 | |
| Duluth A5 | 173 | 187 | 212 | 193 | 8.65 | 9.20 | |
| Fairfield, Ala. T2 | 173 | 187 | 212 | 193 | 8.65 | 9.20 | |
| Galveston D4 | 9.10 | | | | | | |
| Houston S2 | 178 | 192 | 217 | 198 | 8.90 | 9.45 | |
| Jacksonville M4 | 184 | 197 | 219 | 203 | 9.00 | 9.675 | |
| Johnstown B3** | 173 | 190 | 212 | 196** | 8.65 | 9.50** | |
| Joliet, Ill. A5 | 173 | 187 | 212 | 193 | 8.65 | 9.20 | |
| Kokomo C9* | 175 | 189 | 214 | 195* | 8.75 | 9.30* | |
| L. Angeles B2** | | | | | 9.60 | 10.275 | |
| Kansas City S2* | 178 | 192 | 217 | 198* | 8.90 | 9.45* | |
| Minnequa C6† | 178 | 192 | 217 | 198† | 8.90 | 9.45† | |
| Monessen P6 | | | | | 8.65 | 9.20 | |
| Palmer, Mass. W6 | | | | | 9.50 | 9.50* | |
| Pittsburg, Cal. C7 | 192 | 210 | 213 | | 9.60 | 10.15 | |
| Rankin, Pa. A5 | 173 | 187 | 212 | 193 | 8.65 | 9.20 | |
| So. Chicago R3 | 173 | 187 | 212 | 193 | 8.65 | 9.20 | |
| S. San Fran. C6† | | | 236 | | 9.60 | 10.15† | |
| Sparrows Pt. B3** | 175 | | 214 | 198 | 8.75 | 9.425 | |
| Sterling, Ill. N4** | 175 | 192 | 212 | 198 | 8.75 | 9.425 | |
| Struthers, O. Y1* | | | | | 8.65 | 9.30 | |
| Worcester, Mass. A5 | 179 | | | | 8.95 | 9.50 | |
| Williamsport S5 | | | | | | | |

* Zinc less than .10¢.

** 11-12¢ zinc.

*** 10¢ zinc.

† Plus zinc extras.

‡ Wholesalers only.

C-R SPRING STEEL

| Cents Per Lb F.o.b. Mill | CARBON CONTENT | | | | |
|-----------------------------|----------------|-----------|-----------|-----------|-----------|
| | 0.26-0.41 | 0.41-0.61 | 0.61-0.81 | 0.81-1.06 | 1.06-1.35 |
| Baltimore, Md. T8 | 9.50 | 10.70 | 12.90 | 15.90 | 18.85 |
| Bristol, Conn. W12 | | 10.70 | 12.90 | 16.10 | 19.30 |
| Boston T8 | 9.50 | 10.70 | 12.90 | 15.90 | 18.85 |
| Buffalo, N. Y. R7 | 8.95 | 10.40 | 12.60 | 15.60 | 18.55 |
| Carnegie, Pa. S9 | 8.95 | 10.40 | 12.60 | 15.60 | 18.55 |
| Cleveland A5 | 8.95 | 10.40 | 12.60 | 15.60 | 18.55 |
| Dearborn S1 | 9.05 | 10.50 | 12.70 | | |
| Detroit D1 | 9.05 | 10.50 | 12.70 | 15.70 | |
| Detroit D2 | 9.05 | 10.50 | 12.70 | | |
| Dover, O. G4 | 8.95 | 10.40 | 12.60 | 15.60 | 18.55 |
| Evansville, Ind. M8 | 8.95 | 10.40 | 12.60 | 15.60 | 18.55 |
| Franklin Park, Ill. T8 | 9.05 | 10.40 | 12.60 | 15.60 | 18.55 |
| Harrison, N. J. C11 | 9.10 | 10.55 | 12.90 | 16.10 | 19.30 |
| Indianapolis J3 | 9.10 | 10.55 | 12.90 | 16.10 | 19.30 |
| Los Angeles C7 | 11.15 | 12.60 | 14.80 | 17.80 | |
| New Castle, Pa. B4 | 8.95 | 10.40 | 12.60 | 15.60 | |
| New Haven, Conn. D1 | 9.40 | 10.70 | 12.90 | 15.90 | |
| Pawtucket, R. I. N7 | 9.50 | 10.70 | 12.90 | 15.90 | |
| Pittsburgh S7 | 8.95 | 10.40 | 12.60 | 15.60 | 18.55 |
| Riverside, Ill. A1 | 9.05 | 10.40 | 12.60 | 15.60 | 18.55 |
| Sharon, Pa. S1 | 8.95 | 10.40 | 12.60 | 15.60 | 18.55 |
| Trenton R4 | | 10.70 | 12.90 | 16.10 | 19.30 |
| Wallingford W1 | 9.40 | 10.70 | 12.90 | 15.90 | 18.55 |
| Warren, Ohio T4 | 8.95 | 10.40 | 12.60 | 15.60 | 18.75 |
| Worcester, Mass. A5 | 9.50 | 10.70 | 12.90 | 15.90 | 18.85 |
| Youngstown J3 | 8.95 | 10.40 | 12.60 | 15.60 | 18.55 |

BOILER TUBES

| \$ per 100 ft. carload lots, cut 10 to 24 ft. F.o.b. Mill | Size | | Seamless | | Elec. Weld |
|--|------------|-------------|----------|--------|---------------|
| | OD- In. | B.W. Ga. | H.R. | C.D. | |
| Babcock & Wilcox | 2 | 13 | 36.34 | 42.56 | 35.22 |
| | 2 1/2 | 12 | 48.94 | 57.31 | 47.43 |
| | 3 | 12 | 56.51 | 66.18 | 54.77 |
| | 3 1/2 | 11 | 65.97 | 77.25 | 63.93 |
| | 4 | 10 | 87.61 | 102.59 | 85.53 |
| National Tube | 2 | 13 | 36.34 | 42.56 | 35.22 |
| | 2 1/2 | 12 | 48.94 | 57.31 | 47.43 |
| | 3 | 12 | 56.51 | 66.18 | 54.77 |
| | 3 1/2 | 11 | 65.97 | 77.25 | 63.93 |
| | 4 | 10 | 87.61 | 102.59 | 85.53 |
| Pittsburgh Steel | 2 | 13 | 36.34 | 42.56 | |
| | 2 1/2 | 12 | 48.94 | 57.31 | |
| | 3 | 12 | 56.51 | 66.18 | |
| | 3 1/2 | 11 | 65.97 | 77.25 | |
| | 4 | 10 | 87.61 | 102.59 | |

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

| Producing Point | Basic | Fdry. | Mail. | Beas. | Low Phos. |
|-------------------|-------|--------|-------|-------|-----------|
| Birdsboro, Pa. B6 | 68.00 | 68.50 | 69.00 | 69.50 | |
| Birmingham R3 | 62.00 | 62.50* | | | |
| Birmingham W9 | 62.00 | 62.50* | 66.50 | | |
| Birmingham U4 | 62.00 | 62.50* | 66.50 | | |
| Buffalo R3 | 66.00 | 66.50 | 67.00 | 67.50 | |
| Buffalo H1 | 66.00 | 66.50 | 67.00 | 67.50 | |
| Buffalo W6 | 66.00 | 66.50 | 67.00 | 67.50 | |
| Chester P2 | 66.50 | 67.00 | 67.50 | | |
| Chicago I4 | 66.00 | 66.50 | 66.50 | 67.00 | |
| Cleveland A5 | 66.00 | 66.50 | 66.50 | 67.00 | 71.00† |
| Cleveland R3 | 66.00 | 66.50 | 66.50 | 67.00 | |
| Dueth I4 | 66.00 | 66.50 | 66.50 | 67.00 | 71.00† |
| Erie I4 | 66.00 | 66.50 | 66.50 | 67.00 | 71.00† |
| Everett M6 | 67.50 | 68.00 | 68.50 | | |
| Fontana K1 | 75.00 | 75.50 | | | |
| Geneva, Utah C7 | 66.00 | 66.50 | | | |
| Granite City G2 | 67.90 | 68.40 | 68.90 | | |
| Hubbard Y1 | | | 66.50 | | |
| Ironton, Utah C7 | 66.00 | 66.50 | | | |
| Midland C11 | 66.00 | | | | |
| Minneapolis C6 | 66.00 | 68.50 | 69.00 | | |
| Monessen P6 | 66.00 | | | | |
| Neville Ia, P4 | 66.00 | 66.50 | 66.50 | 67.00 | 71.00† |
| N. Tonawanda T1 | 66.00 | 66.50 | 67.00 | 67.50 | |
| Sharysville S3 | 66.00 | | 66.50 | 67.00 | |
| So. Chicago R3 | 66.00 | 66.50 | 66.50 | 67.00 | |
| So. Chicago W8 | 66.00 | 66.50 | 66.50 | 67.00 | |
| Swedeland A2 | 66.00 | 66.50 | 66.50 | 67.00 | |
| Toledo I4 | 66.00 | 66.50 | 66.50 | 67.00 | |
| Troy, N. Y. R3 | 68.00 | 68.50 | 69.00 | 69.50 | 74.00 |
| Youngstown Y1 | | | 66.50 | 67.00 | |

DIFFERENTIALS: Add, 75¢ per ton for each 0.25 pct silicon or portion thereof over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.25 pct manganese or portion thereof over 1 pct, \$2 per ton for 0.50 to 0.75 pct nickel, \$1 for each additional 0.25 pct nickel. Add \$1.00 for 0.31-0.69 pct phos.

Silvery Iron: Buffalo (6 pct), H1, \$79.25; Jackson J1, I4 (Globe Div.), \$78.00; Niagara Falls (15.01-15.50), \$101.00; Keokuk (14.01-14.50), \$103.50; (15.51-16.00), \$106.50. Add \$1.00 per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 18 pct. Add \$1.25 for each 0.50 pct manganese over 1.00 pct. Bassmaster silvery pig iron (under .10 pct phos.), \$64.00. Add \$1.00 premium for all grades silvery to 18 pct.

† Intermediate low phos.

STAINLESS STEEL

Base price cents per lb f.o.b. mill

| Product | 201 | 202 | 301 | 302 | 303 | 304 | 316 | 321 | 347 | 403 | 410 | 416 | 430 |
|--------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Ingots, re-rolled | 22.00 | 23.75 | 23.25 | 25.25 | — | 27.00 | 39.75 | 32.25 | 37.00 | — | 16.75 | — | 17.00 |
| Slabs, billets | 27.00 | 27.00 | 28.00 | 31.50 | 32.00 | 33.25 | 49.50 | 40.00 | 46.50 | — | 21.50 | — | 21.75 |
| Billets, forging | — | 36.50 | 37.25 | 38.00 | 41.00 | 40.50 | 62.25 | 47.00 | 55.75 | 32.00 | 28.25 | 28.75 | 28.75 |
| Bars, struct. | 42.00 | 43.00 | 44.25 | 45.00 | 48.00 | 47.75 | 73.00 | 55.50 | 64.75 | 37.75 | 33.75 | 34.25 | 34.25 |
| Plates | 44.25 | 45.00 | 46.25 | 47.25 | 50.00 | 50.75 | 76.75 | 59.75 | 69.75 | 40.25 | 35.00 | 36.75 | 36.00 |
| Sheets | 48.50 | 49.25 | 51.25 | 52.00 | — | 55.00 | 80.75 | 65.50 | 79.25 | 48.25 | 40.25 | — | 40.75 |
| Strip, hot-rolled | 36.00 | 39.00 | 37.25 | 48.50 | — | 44.25 | 69.25 | 53.50 | 63.50 | — | 31.00 | — | 32.00 |
| Strip, cold-rolled | 45.00 | 49.25 | 47.50 | 52.00 | — | 55.00 | 80.75 | 65.50 | 79.25 | 48.25 | 40.25 | — | 40.75 |
| Wire CF; Rod HR | 40.00 | 40.75 | 42.00 | 42.75 | 45.50 | 45.25 | 69.25 | 52.50 | 61.50 | 35.75 | 32.00 | 32.50 | 32.50 |

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., C11; Brackenridge, Pa., A3; Butler, Pa., A7; Vandergrift, Pa., U1; Washington, Pa., W2, J2; Baltimore, Md.; Middletown, O., A7; Massillon, O., R3; Gary, Ind.; Bridgeville, Pa., U2; New Castle, Ind., I2.

Strip: Midland, Pa., C11; Waukegan, Cleveland, A5; Carnegie, Pa., S9; McKeesport, Pa., F1; Reading, Pa., C2; Washington, Pa., W2; W. Leeburg, Pa., A3; Bridgeville, Pa., U2; Detroit, M2; Canton, Massillon, O., R3; Harrison, N. Y., D3; Youngstown, J3; Sharon, Pa., S7; Butler, Pa., A7; Wallingford, Conn., U3 (plus further conversion extras); W1 (.25¢ per lb higher); New Bedford, Mass., R6; Gary, Ind. (.25¢ per lb higher).

Bar: Baltimore, Md.; S. Duquesne, Pa., U1; Munhall, Pa., U1; Reading, Pa., C2; Titusville, Pa., U2; Washington, Pa., J2; McKeesport, Pa., U1, F1; Bridgeville, Pa., U2; Dunkirk, N. Y., A3; Massillon, O., R3; S. Chicago, U1; Syracuse, N. Y., C11; Watervliet, N. Y., A3; Waukegan, A5; Canton, O., T5, R3; Ft. Wayne, I4; Detroit, R5; Gary, Ind.; Owensboro, Ky., G3; Bridgeport, Conn., N8.

Wire: Waukegan, A5; Massillon, O., R3; McKeesport, Pa., F1; Ft. Wayne, J4; Harrison, N. J., D3; Baltimore, Md.; Dunkirk, A3; Monessen, P1; Syracuse, U1; Bridgeville, U2.

Structurals: Baltimore, Md.; Massillon, O., R3; Chicago, Ill., J4; Watervliet, N. Y., A3; Syracuse, C11; S. Chicago, U1.

Plates: Brackenridge, Pa., A3; Chicago, U1; Munhall, Pa., U1; Midland, Pa., C11; New Castle, Ind., I2; Middletown, A7; Washington, Pa., J2; Cleveland, Massillon, R3; Coatesville, Pa., C15; Vandergrift, Pa., U1; Gary, Ind.

Forging billets: Midland, Pa., C11; Baltimore, Md.; Washington, Pa., J2; McKeesport, F1; Massillon, Canton, O., R3; Watervliet, A3; Pittsburgh, Chicago, U1; Syracuse, C11; Detroit, R5; Munhall, Pa., S. Chicago, U1; Owensboro, Ky., G3; Bridgeport, Conn., N8.

(Effective April 21, 1958)

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Users are finding that this machine provides a rapid, accurate and economical means of sharpening metal saws from 1/4" to 14" in diameter, from finest teeth to 2 per inch. It will sharpen all saws that are used in cutting steels, brass, copper, bronze, aluminum, plastics, etc., and arbors are supplied for hole sizes from 1/4" to 1" in diameter. Also available for use on the Hamco Automatic Saw Sharpener are automatic attachments for hole saw, band saw, and hack saw sharpening.

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Dept. G, 95 Mt. Hope Ave. Rochester 20, N. Y.

FERROALLOY PRICES

Ferrochrome

| | | | |
|--|-------|-------------|-------|
| Cents per lb contained Cr, lump, bulk, carloads, del'd. 67-71% Cr, .30-1.00% max. Si | | | |
| 0.02% C.... | 41.00 | 0.50% C.... | 38.00 |
| 0.05% C.... | 39.00 | 1.00% C.... | 37.75 |
| 0.10% C.... | 38.50 | 1.50% C.... | 37.50 |
| 0.20% C.... | 38.25 | 2.00% C.... | 37.25 |
| 4.00-4.50% C, 60-70% Cr, 1-2% Si... | | | 28.75 |
| 3.50-5.00% C, 57-64% Cr, 2.00-4.50% Si | | | 27.50 |
| 0.25% C (Simplex) | | | 36.75 |
| 0.10% C, 52-57% Cr, 2.00% max Si, 7-8 1/2% max C, 50-55% Cr, 3-6% max Si | | | 22.50 |
| 7-8 1/2% max C, 50-55% Cr, 3% max Si | | | 25.00 |

High Nitrogen Ferrochrome

Low-carbon type 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome max. 0.10% C price schedule. Add 5¢ for each additional 0.25% of N.

Chromium Metal

| | |
|---|--------|
| Per lb chromium, contained, packed, delivered, ton lots, 97% min. Cr, 1% max. Fe. | |
| 0.10% max. C | \$1.31 |
| 0.50% max. C | 1.31 |
| 9 to 11% C, 88-91% Cr, 0.75% Fe... | 1.40 |

Electrolytic Chromium Metal

| | |
|--|--------|
| Per lb of metal 2" x D plate (1/4" thick) delivered packed, 99.80% min. Cr. (Metallic Base) Fe 0.20 max. | |
| Carloads | \$1.29 |
| Ton lots | 1.31 |
| Less ton lots | 1.33 |

Low Carbon Ferrochrome Silicon

| | | |
|---|-------|-------|
| (Cr 34-41%, Si 42-45%, C 0.05% max.) Carloads, delivered, lump, 3-in. x down, packed. | | |
| Price is sum of contained Cr and contained Si. | | |
| | Cr | Si |
| Carloads | 27.50 | 14.20 |
| Ton lots | 32.75 | 15.65 |
| Less ton lots | 34.35 | 17.30 |

Calcium-Silicon

| | |
|---|-------|
| Per lb of alloy, lump, delivered, packed. 30-33% Cr, 60-65% Si, 3.00 max. Fe. | |
| Carloads | 25.65 |
| Ton lots | 27.95 |
| Less ton lots | 29.45 |

Calcium-Manganese-Silicon

| | |
|--|-------|
| Cents per lb of alloy, lump, delivered, packed. 16-20% Ca, 14-18% Mn, 53-59% Si. | |
| Carloads | 24.25 |
| Ton lots | 26.15 |
| Less ton lots | 27.15 |

5M2

| | |
|---|-------|
| Cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe 1/2 in. x 12 mesh. | |
| Ton lots | 21.15 |
| Less ton lots | 22.40 |

V Foundry Alloy

| | |
|--|-------|
| Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, V-5: 38-42% Cr, 17-19% Si, 8-11% Mn, packed. | |
| Carload lots | 18.45 |
| Ton lots | 19.95 |
| Less ton lots | 21.20 |

Graphidox No. 4

| | |
|--|-------|
| Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%. | |
| Carload packed | 19.20 |
| Ton lots to carload packed | 21.15 |
| Less ton lots | 22.40 |

Ferromanganese

Maximum base price, f.o.b., lump size, base content 74 to 76 pct Mn.

| | | |
|--|--|--------------|
| Producing Point | | Cents per-lb |
| Marietta, Ashtabula, O.; Alloy, W. Va.; Sheffield, Ala.; Portland, Ore. | | 12.25 |
| Johnstown, Pa. | | 12.25 |
| Neville Island, Pa. | | 12.25 |
| Sheridan, Pa. | | 12.25 |
| Philo, Ohio | | 12.25 |
| S. Duquesne | | 12.25 |
| Add or subtract 0.1¢ for each 1 pct Mn above or below base content. | | |
| Briquets, delivered, 66 pct Mn: | | |
| Carloads, bulk | | 14.80 |
| Ton lots packed in bags | | 17.20 |

Spiegeleisen

| | |
|---|----------|
| Per gross ton, lump, f.o.b. Palmerton, Pa., and Neville Island, Pa. | |
| Manganese Silicon | |
| 16 to 19% 3% max. | \$106.50 |
| 19 to 21% 3% max. | 102.50 |
| 21 to 23% 3% max. | 105.00 |

Manganese Metal

| | |
|--|-------|
| 2 in. x down, cents per pound of metal delivered. | |
| 95.50% min. Mn, 0.2% max. C, 1% max. Si, 2.5% max. Fe. | |
| Carload, packed | 45.75 |
| Ton lots | 47.25 |

Electrolytic Manganese

| | |
|--|-------|
| F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, f.o.b. Marietta, O., delivered, cents per pound. | |
| Carloads | 34.00 |
| Ton lots | 36.00 |
| 250 to 1999 lb | 38.00 |
| Premium for Hydrogen - removed metal | 0.75 |

Medium Carbon Ferromanganese

| | |
|--|-------|
| Mn 80 to 85%, C 1.25 to 1.50, Si 1.50% max., carloads, lump, bulk, delivered, per lb of contained Mn | |
| | 25.50 |

Low-Carb Ferromanganese

| | | | |
|---|----------|-------|-------|
| Cents per pound Mn contained, lump size, del'd Mn 85-90%. | | | |
| | Carloads | Ton | Less |
| 0.07% max. C, 0.06% (Bulk) | | | |
| P, 90% Mn | 37.15 | 39.95 | 41.15 |
| 0.07% max. C | 35.10 | 37.90 | 39.10 |
| 0.10% max. C | 34.35 | 37.15 | 38.35 |
| 0.15% max. C | 33.60 | 36.40 | 37.60 |
| 0.30% max. C | 32.10 | 34.90 | 36.10 |
| 0.50% max. C | 31.60 | 34.40 | 35.60 |
| 0.75% max. C, 80-85% Mn, 5.0-7.0% Si | 28.60 | 31.40 | 32.60 |

Silicomanganese

| | |
|--|-------|
| Lump size, cents per pound of metal, 65-68% Mn, 18-20% Si, 1.5% max. C for 2% max. C, deduct 0.2¢ f.o.b. shipping point. | |
| Carloads bulk | 12.80 |
| Ton lots, packed | 14.45 |
| Briquet contract basis carloads, bulk, delivered, per lb of briquet | 15.10 |
| Ton lots, packed, pallets | 16.50 |

Silvery Iron (electric furnace)

| | |
|---|--|
| Si 15.50 to 16.00 pct, f.o.b. Keokuk, Iowa, or Wenatchee, Wash., \$106.50 gross ton, freight allowed to normal trade area. Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., \$93.00. | |
|---|--|

Silicon Metal

| | | |
|---|------------------|------------------|
| Cents per pound contained Si, lump size, delivered, packed. | | |
| | Ton lots, packed | Carloads, packed |
| 96.75% Si, 1.25% Fe | 24.20 | 22.90 |
| 98% Si, 0.75% Fe | 24.95 | 23.65 |

Silicon Briquets

| | |
|--|-------|
| Cents per pound of briquets, bulk, delivered, 40% Si, 2 lb Si, briquets. | |
| Carloads, bulk | 7.70 |
| Ton lots, packed | 10.50 |

Electric Ferrosilicon

| | | |
|---|-------|------------------|
| Cents per lb contained Si, lump, bulk, carloads, f.o.b. shipping point. | | |
| 50% Si.... | 14.20 | 75% Si.... 16.40 |
| 65% Si.... | 15.25 | 85% Si.... 18.10 |
| 90% Si.... | 19.50 | |

Ferrovandium

| | |
|---|------|
| 50-55% V delivered, per pound, contained V, carloads, packed. | |
| Openhearth | 3.20 |
| Crucible | 3.30 |
| High speed steel (Primosa) | 3.40 |

Calcium Metal

| | | | |
|--|--------|----------|-----------|
| Eastern zone, cents per pound of metal, delivered. | | | |
| | Cast | Turnings | Distilled |
| Ton lots | \$2.05 | \$2.95 | \$3.75 |
| 100 to 9999 lb. | 2.40 | 3.30 | 4.55 |

(Effective April 21, 1958)

| | |
|--|--------|
| Alsiifer, 20% Al, 40% Si, 40% Fe, f.o.b. Suspension Bridge, N. Y., per lb. | |
| Carloads, bulk | 10.35¢ |
| Ton lots | 11.70¢ |

| | |
|---|--------|
| Calcium molybdate, 43.6-46.6% f.o.b. Langeloth, Pa., per pound contained Mo | |
| | \$1.28 |

| | |
|---|--------|
| Ferrochromium, 50-50%, 2 in. x D, delivered per pound contained Cb. | |
| Ton lots | \$4.00 |
| Less ton lots | 4.05 |

| | |
|--|--------|
| Ferro-tantalum-columbium, 20% Ta, 40% Cb, 0.30% C, del'd ton lots, 2-in. x D per lb con't Sb plus Ta | |
| | \$3.80 |

| | |
|--|--------|
| Ferromolybdenum, 55-75%, 200-lb containers, f.o.b. Langeloth, Pa., per pound contained Mo .. | |
| | \$1.68 |

| | |
|---|----------|
| Ferrophosphorus, electric, 23-26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., \$4.00 unitage, per gross ton | |
| | \$90.00 |
| 10 tons to less carload | \$110.00 |

| | |
|--|--------|
| Ferro-titanium, 40% regular grade 0.10% C max., f.o.b. Niagara Falls, N. Y., and Cambridge, O., freight allowed, ton lots, per lb contained Ti | |
| | \$1.35 |

| | |
|--|--------|
| Ferro-titanium, 25% low carbon, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Cambridge, O., freight allowed, ton lots, per lb contained Ti | |
| | \$1.50 |
| Less ton lots | \$1.54 |

| | |
|--|----------|
| Ferro-titanium, 15 to 18% high carbon, f.o.b. Niagara Falls, N. Y., freight allowed, carload per net ton | |
| | \$240.00 |

| | |
|--|------------------|
| Ferrotungsten, 1/4 x down packed, per pounds contained W, ton lots delivered | |
| | \$2.15 (nominal) |

| | |
|---|--------|
| Molybdenic oxide, briquets per lb contained Mo, f.o.b. Langeloth, Pa., barks, f.o.b. Washington, Pa., Langeloth, Pa. | |
| | \$1.38 |

| | |
|--|--------|
| Simanal, 20% Si, 20% Mn, 20% Al, f.o.b. Philo, Ohio, freight allowed per lb. | |
| Carload, bulk lump | 18.50¢ |
| Ton lots, packed lump | 20.50¢ |
| Less ton lots | 21.00¢ |

| | |
|---|--------|
| Vanadium oxide, 86-89% V ₂ O ₅ per pound contained V ₂ O ₅ | |
| | \$1.38 |

| | |
|--|--------|
| Zirconium, per lb of alloy 35-40% f.o.b. freight allowed, carloads, packed | |
| | 27.25¢ |
| 12-15% del'd lump, bulk-carloads | 9.25¢ |

Boron Agents

| | |
|--|--------|
| Borasil, per lb of alloy del. f.o.b. Philo, Ohio, freight allowed, B 3-4%, Si 40-45%, per lb contained B | |
| 2000 lb carload | \$5.50 |

| | |
|---|-----|
| Borfram, f.o.b. Niagara Falls. Ton lots per pound | |
| | 45¢ |
| Less ton lots, per pound | 50¢ |

| | |
|--|--------|
| Corboram, Ti 15-21%, B 1-2%, Si 2-4%, Al 1-2%, C 4-6-7.5%, f.o.b. Suspension Bridge, N. Y., freight allowed. | |
| Ton lots per pound | 14.00¢ |

| | |
|---|------|
| Ferroboreon, 17.50 min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D, ton lots, f.o.b. Wash. Pa., Niagara Falls, N. Y., delivered 100 lb up | |
| 10 to 14% B | .85 |
| 14 to 19% B | 1.20 |
| 19% min. B | 1.50 |

| | |
|--|--------|
| Grainal, f.o.b. Cambridge, O., freight, allowed, 100 lb and over | |
| No. 1 | \$1.05 |
| No. 79 | 50¢ |

| | |
|--|--------|
| Manganese-Boron, 75.00% Mn, 15.20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, del'd. | |
| Ton lots (packed) | \$1.46 |
| Less ton lots (packed) | 1.57 |

| | |
|--|------|
| Nickel-Boron, 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, del'd less ton lots | |
| | 2.15 |

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|-----------|---------|-------------|--------------|-------|-----------|
| Qu. | H.P. | Make | Type | Volts | RPM |
| 1 | 3900 | New Elliott | Enc. F.V. | 475 | 320 |
| 2 | 3000 | New Whse. | Enc. F.V. | 525 | 600 |
| 1 | 2250 | New Elliott | Enc. F.V. | 600 | 200/300 |
| 1 | 2200 | G.E. | MCF | 600 | 400/500 |
| 1 | 1750 | New Elliott | Enc. F.V. | 250 | 175/350 |
| 1 | 1500 | Whse. | Enc. F.V. | 525 | 600 |
| 4 | 1500 | Whse. | Enc. F.V. | 525 | 600 |
| 1 | 1375 | G.E. | MCF | 415 | 1300 |
| 1 | 1300 | G.E. | MCF-12 | 300 | 200/400 |
| 1 | 1200 | G.E. | MCF | 600 | 450/600 |
| 1 | 1000 | Whse. | QM | 500 | 200/2000 |
| 1 | 840 | Whse. | MCF | 250 | 140/170 |
| 1 | 750 | G.E. | MCF | 250 | 100/750 |
| 1 | 750 | G.E. | MCF | 600 | 450/900 |
| 1 | 600 | G.E. | MCF | 600 | 300/720 |
| 1 | 500 | G.E. | MCF | 600 | 120/360 |
| 1 | 500 | G.E. | TLF-2656H | 250 | 275/550 |
| 1 | 500 | G.E. | MPC-10 | 250 | 2000/3600 |
| 1 | 450 | Whse. | R.B. | 250 | 188/400 |
| 2 | 400 | G.E. | CY-275 | 300 | 1000/1500 |
| 1 | 300 | Cr. Wh. | H-102 B.B. | 250 | 1200 |
| 2 | 300 | G.E. | MCF-6 | 250 | 190/380 |
| 2 | 300 | G.E. | MPC | 230 | 400 |
| 2 | 275 | G.E. | TLC-108 | 250 | 2000/4000 |
| 1 | 250 | G.E. | MDP-614AE | 425 | 950 |
| 1 | 225 | G.E. | TLC-110 | 250 | 1150/3600 |
| 1 | 200 | Whse. | CB207.4 | 250 | 850/1200 |
| 1 | 150 | Cr. Wh. | CMC-65H | 230 | 1150 |
| 1 | 150 | G.E. | CD. R.B. | 600 | 250/750 |
| 1 | 150 | G.E. | TLC-74 B.B. | 250 | 1150/3500 |
| 1 | 120 | G.E. | TLC-50 B.B. | 250 | 1250/5000 |
| 1 | 125/150 | Whse. New | CB-210.3 | 230 | 300/1200 |
| 1 | 120 | Rel. | 1050T R.B. | 230 | 575/900 |
| 2 | 125 | Whse. | SK-190 | 230 | 450/1200 |
| 1 | 125 | Whse. | SK-185 | 230 | 450/1050 |
| 1 | 100 | G.E. | CDP-115 | 230 | 1750 |
| 2 | 100 | Whse. | SK-181 | 230 | 450/1000 |
| 1 | 75 | G.E. R.R. | CD-1235 D.P. | 600 | 850 |
| 6 | 40 | Rel. D.B. | 383F T22PC | 250 | 500/1500 |

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3-150 KW. G.E. Sealed Tube Ignition Unit Substation load centers 275 V. D.C. 2300 V. A.C. Pyralol filled transformers complete.

2-150 KW. G.E. Ignition, 245 V. D.C.—220 V. A.C., air cooled transformers with controls.

MG SETS—3 Ph. 60 Cy.

| Qu. | K.W. | Make | RPM | DC Volts | AC Volts |
|-----|-----------|----------|------|----------|---------------|
| 1 | 2000 | G.E. | 514 | 600 | 2300/4600 |
| 2 | 1750/2100 | G.E. | 514 | 250/300 | 2300/4600 |
| 1 | 1500 | G.E. | 720 | 600 | 6000/13200 |
| 1 | 1500 | G.E. | 400 | 600 | 2300/4150 |
| 2 | 1000 | G.E. | 720 | 600 | 6000/13200 |
| 2 | 750 | G.E. | 720 | 250/300 | 6000/13200 |
| 1 | 500 | Whse. | 900 | 125/250 | 440 |
| 1 | 500 | G.E. | 900 | 125/250 | 440 |
| 1 | 350 | G.E. | 900 | 125 | 440/2300/4160 |
| 1 | 300 | G.E. | 1200 | 250 | 2300/4000 |
| 1 | 300 | G.E. | 1200 | 250 | 440/2300 |
| 1 | 250 | Whse. | 1200 | 250/275 | 2300 |
| 1 | 200 | G.E. | 1200 | 250 | 440/550 |
| 1 | 200 | Whse. | 1200 | 550 | 2200 |
| 1 | 200 | El. Mhy. | 1200 | 250 | 2300/4600 |
| 1 | 150 | G.E. | 1200 | 275 | 2300 |
| 1 | 150 | Whse. | 1200 | 275 | 2300 |
| 1 | 150 | G.E. | 1200 | 125 | 440 |
| 1 | 140 | Cr. Wh. | 690 | 125/250 | 2300 |
| 1 | 100 | G.E. | 1170 | 250 | 220/440 |
| 1 | 100 | Cr. Wh. | 1180 | 240 | 440 |
| 2 | 100 | Cr. Wh. | 1180 | 525 | 220/550 |
| 1 | 100 | G.E. | 1200 | 250 | 2400/4000 |
| 2 | 75 | (unused) | 1200 | 125 | 440 |

TRANSFORMERS

| Qu. | KVA | Make | Type | Ph. | Voltage |
|-----|------|-----------|---------|-----|--------------------|
| 3 | 3333 | Whse. | OTSC | 1 | 12600 x 2300 |
| 1 | 1500 | G.E. auto | HT | 3 | 4000/4200/4400 |
| 3 | 1000 | G.E. | HVDDJ | 1 | 2400 x 480 |
| 3 | 1000 | G.E. | OA/PA | 1 | 13500 x 220/460 |
| 2 | 750 | G.E. | Pyralol | 1 | 4800x83/55-255/165 |
| 3 | 500 | Kuhl | OTSC | 1 | 13200 x 6600 |
| 3 | 333 | G.E. | OTSC | 1 | 13200 x 2300/4360Y |
| 3 | 150 | G.E. | OTSC | 1 | 33000x2300/44000Y |
| 3 | 100 | Whse. | SC | 1 | 4600x460/250/115 |

CRANE & MILL MOTORS 230 V., D.C.

| Qu. | H.P. | Make | RPM | Type |
|-----|---------|---------|---------|-----------------|
| 14 | 12/15 | Whse. | 700/600 | MCA-30, Series |
| 1 | 20 | Whse. | 975 | K-5, Series |
| 2 | 23 | G.E. | 650 | MDR-408- |
| 2 | 25 | G.E. | 725 | AD-2 sh. |
| 1 | 35 | Whse. | 480 | CO-1805, Series |
| 1 | 35 | Whse. | 480 | CK-9 Comp. S.R. |
| 1 | 45 | Whse. | 480 | CK-9 Sh. S.R. |
| 3 | 50 | G.E. | 600 | CK-9 Comp. S.R. |
| 3 | 50 | Whse. | 525 | COM-1830 Comp. |
| 2 | 50 | Whse. | 600 | CK-9 Shunt R.R. |
| 1 | 50 | G.E. | 550 | MD-412AE 2 |
| 1 | 50 | Cr. Wh. | 850 | Comp. R.R. |
| 1 | 100 | G.E. | 475 | SV-50 Comp. |
| 6 | 100/140 | Whse. | 500/415 | CO-1832 |
| 9 | 125 | G.E. | 625 | Series S.R. |

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THE CLEARING HOUSE

Sales Continue Slow At Pittsburgh

Used machinery dealers encouraged as good inquiry rate shows buyers are still interested in equipment.

But turning the inquiries into sales is difficult.

■ Sales continue to drag in Pittsburgh and dealers are working hard for the orders they get. For every order a dealer receives, he must wade through a heavy load of inquiries and paperwork.

Business is slow but there is still an underlying firmness to the market. Dealers find these encouraging signs:

The number of inquiries indicates a widespread need for machinery. Prices are holding up fairly well. Despite some shading among dealers there is no general price warfare. Plants are not dumping equipment on the market. There are few distress sales and sellers are holding out for their price.

Push Wanted—Dealers believe these facts reflect general economic strength. Cash is tight. Business is slow. But the market has not collapsed. Plants are keeping a close check on available machinery. All they need is a few orders of their own and they will start buying machinery.

For suppliers of steel mill equipment, the market lag has brought no supply glut. "If someone came along with an exceptionally good mill, it would be snapped up in no time at all," says one dealer.

Export Red Tape—The need for modernization promises to keep the foreign market active in coming years. However, dealers are ham-

pered by cumbersome import rules. Mexico, for example, has an ancient embargo covering carload shipments. To ship heavy equipment into the country, a dealer must first apply for clearance with the Association of American Railroads.

The request then goes to the Mexican embassy. Full clearance must be obtained on the shipping route before the railroads will accept equipment for loading. One big order is now being held up by this process.

Off Again, On Again—Business is spotty in the general equipment field, says one dealer. There will be two good weeks, then a slowdown. Customers are interested in both machine tools and fabricating equipment. The larger plants are going more and more to production tools. "We have inquiries," says the dealer, "but no one wants to part with cash."

Supplies Are Better—The supply picture has improved but shears, brakes, and late model lathes are still tight. With the trade, there has been some loosening of supply lines. More dealers are coming around with equipment to sell.

However, there is no general unloading. In one case a plant in the West was offering a large volume of equipment for sale. It turned out the firm was not liquidating its own production facilities but had gone into the machinery business, buying surplus stock and reselling it.

Another dealer reports new interest in large rolls. He feels the road building program may be waking up fabricators.

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Pels Type JH All Steel Bender & Straightener for Beams, Channels, Angles, Tees—Angles Equal & Tees 8 x 8 x 1 1/4"

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12" x 5/16" Bertsch Initial Type
18" x 1" Niles Pyramid Type

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| 8 ton P&H | 55" Span 220/3/60 |
| 10 ton P&H | 39" Span 230 Volt D.C. |
| 10 ton Shaw | 48" Span 230 Volt D.C. |
| 10 ton P&H | 52" Span 250 Volt D.C. |
| 10 ton Shaw | 120" Span 230 Volt D.C. |
| 15 ton Shepard Niles | 56" Span 230 Volt D.C. |
| 20 ton P&H | 98" Span 250 Volt D.C. |
| 120 ton Shepard Niles | 100" Span 250 Volt D.C. |
| | 77" Span 220/3/60 |

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500 ton Watson Sullivan & Col. Piercing Press
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1500 ton Bliss 15" Stroke, Bed 49" x 48"
1500 ton Mesta Steam Hydr. Forging Press
4500 Baldwin-Lima-Hamilton Hydr. Forging Press

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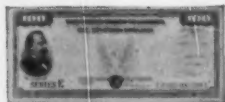
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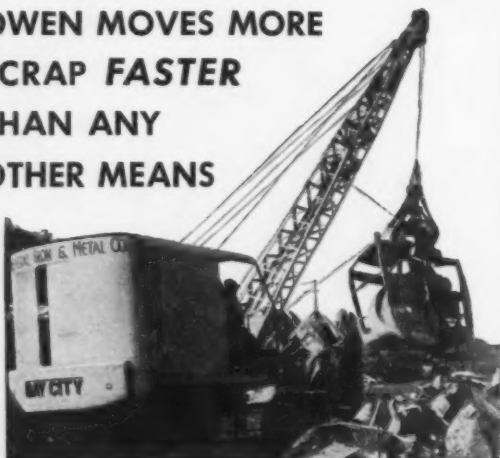


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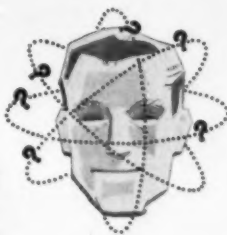
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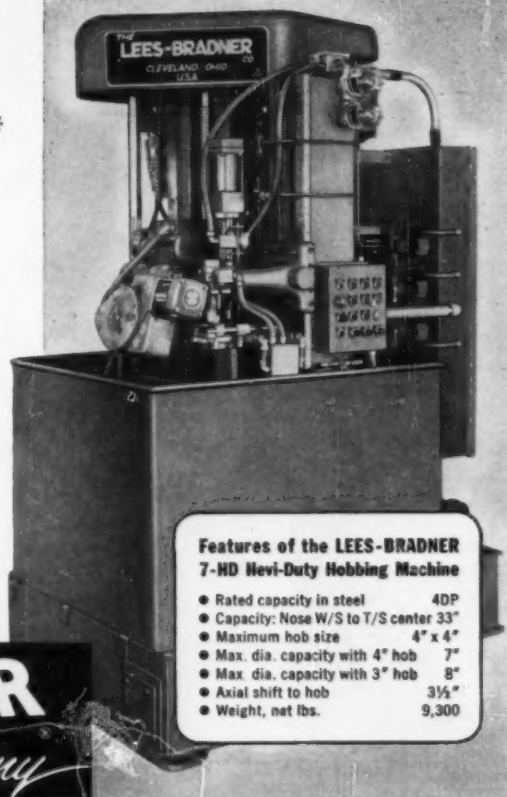
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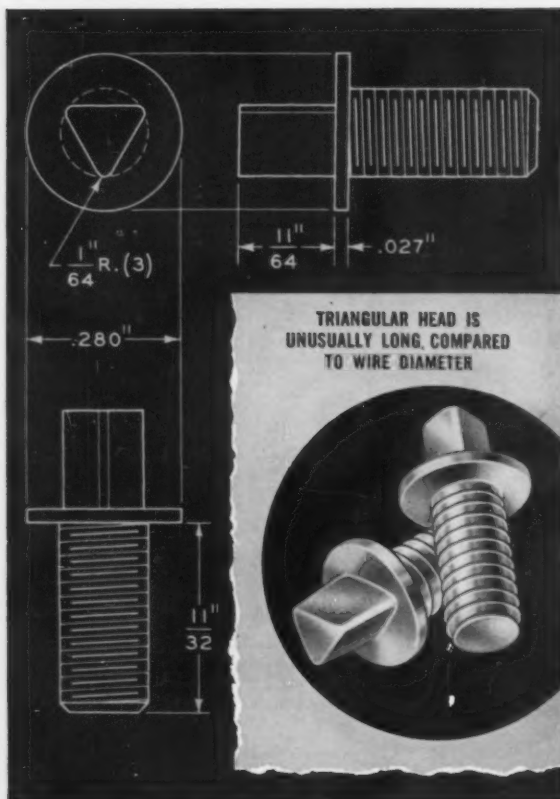
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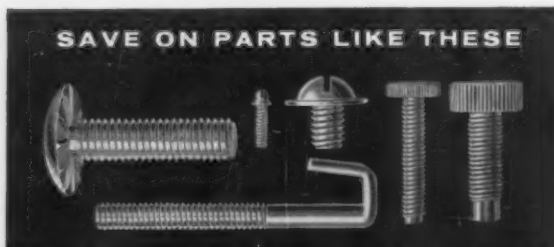
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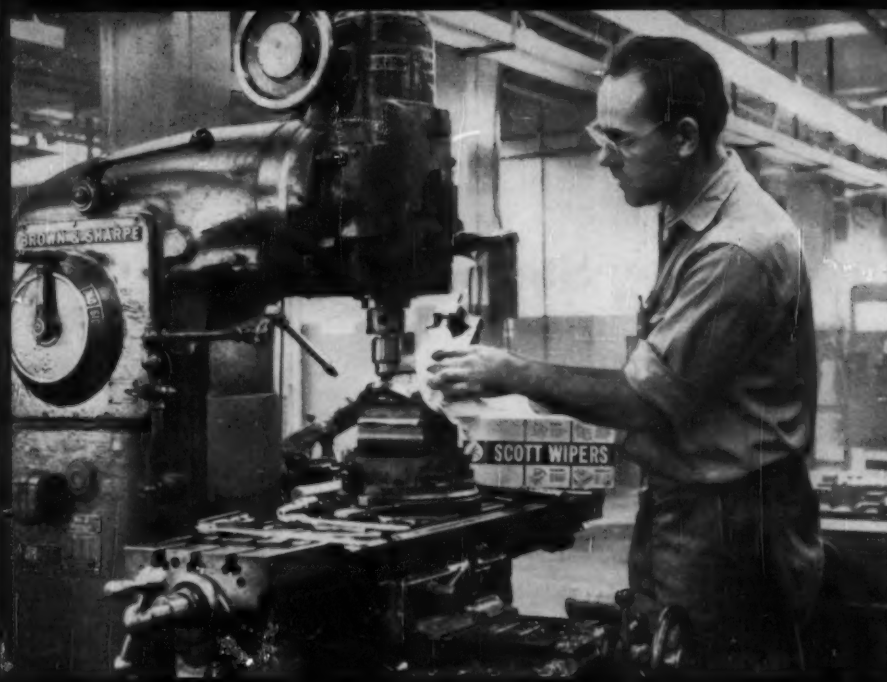
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Cold-Finishing of Alloy Steel Bars: Turning and Polishing

Continuing our discussion of the cold-finishing of alloy steel bars, we take up the subject of turning and polishing. A later discussion will cover grinding and polishing. Both require removal of surface metal. In both the turning and grinding operations, adequate allowances provide for the removal of decarburization and surface defects which sometimes occur in alloy bars.

As previously stated, the outstanding advantage of cold-drawn bars over hot-rolled bars is the *bright, smooth finish*. However, the quality of the cold-drawn finish varies with the size and amount of draft (reduction of cross-sectional area) applied in cold-drawing. For example, by using a $\frac{1}{16}$ -in. draft, a $\frac{3}{4}$ -in. round would have a better cold-drawn finish than a 3-in. round.

When a superior mirror-like finish with additional accuracy is required on surfaces that are not machined (such as on shafting or machine parts), two processes other than cold-drawing are suggested: turning and polishing, and grinding and polishing. The first of these will be discussed here.

Turning and Polishing. This method of cold-finishing is generally associated with centerless bar-turners, accommodating rounds from 1 $\frac{1}{4}$ -in. to 6-in. diam, inclusive. The process is the reverse of conventional lathe-turning, which is normally used for larger sizes. The centerless turning equipment uses two cutter heads which contain from one to four cutting tools. The system provides for both rough and finish cuts. The bar, which is stationary, is fed horizontally into the rotary cutter heads by means of a

mechanical or hydraulic feeding mechanism. Most bar-turners are equipped with a series of polishing rolls that also rotate around the bar as it feeds from the rotary cutter heads. This, combined with subsequent burnishing action from the straightening rolls, imparts a high degree of polished finish to the product. A polished surface on a turned bar can also be produced by a number of passes through the straightening rolls.

This process is applicable to normalized, annealed, or heat-treated carbon and alloy bars. It does not materially affect the mechanical properties. For this reason, the end product can be machined unsymmetrically, with little or no tendency to warp.

Bethlehem metallurgists will gladly work out any problem in the cold-finishing of alloy steel bars. Always feel free to ask for their services.

When you are in need of steels remember, too, that Bethlehem manufactures the entire range of AISI standard alloy grades, as well as special analysis steels and all carbon grades.

If you would like reprints of this series of advertisements, please write to us, addressing your request to Publications Department, Bethlehem Steel Company, Bethlehem, Pa. The subjects in the series are now available in a handy 40-page booklet, and we shall be glad to send you a free copy.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation



BETHLEHEM STEEL

TRABON

CENTRALIZED LUBRICATING SYSTEMS

It took 3 men
two days to do
the lubricating job
Trabon now
does in
5 minutes!

Before Trabon Centralized Lubricating Systems were installed on this soaking pit cover crane, the lubrication had to be done manually to protect 159 critical bearings. It took 3 men working two days under extremely hazardous conditions to do the job. And what a job with the top cover of the soaking pit registering 300 degrees. Now, a Trabon positive system delivers lubricant from a Trabon pump to progressive feeders which distribute the exact amount of lubricant needed to all bearings no matter where located. The savings in labor, lubricant and increased production run into the thousands of dollars.

Trabon is designed for mechanical, electric motorized, hydraulic, and pneumatic operation. No other centralized lubricating system has this versatility without needing expensive auxiliary machinery. Learn for yourself why Trabon usually is entrusted with Industry's roughest-toughest lubricating jobs. Write for specifications and literature — today!



Trabon protects 159 bearings on this soaking pit cover crane at the Brier Hill Works of Youngstown Sheet & Tube Company. Trabon is the positive economical single line system of centralized lubrication that is famous throughout Industry for handling the roughest-toughest lubricating jobs Note close-up of Trabon pump and feeders.



Trabon Engineering Corporation

28815 Aurora Road • Solon, Ohio

Centralized OIL AND GREASE SYSTEMS *Masterflex* CIRCULATING OIL SYSTEMS



FROM START TO FINISH IN HANDLING STEEL

From scrap yard to finished product, the modern efficient way to handle metals is with a Cutler-Hammer Supermagnet . . . the first name in lifting magnets for more than fifty years!



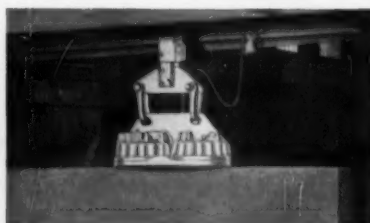
SPECIAL PURPOSE MAGNETS

Designed for specific applications, Cutler-Hammer Magnets can substantially reduce handling costs. As shown in the main illustration, Cutler-Hammer Rail Handling Magnets move multiple rails swiftly, efficiently, and safely.



BI-POLAR MAGNETS

These Cutler-Hammer Magnets are designed specifically for handling structural shapes such as I beams, angles, and channels. Cutler-Hammer Bi-Polar Magnets have played a major role in cutting the cost of classifying and stacking beams for shipment.



DUPLEX MAGNETS

This custom-built duplex magnet for slab turning in a scarfing department is a good demonstration of Cutler-Hammer's ability to design and build magnets for even the most varied and specialized applications.



CIRCULAR MAGNETS

Cutler-Hammer Supermagnets are known the world-over for their versatility, durability, and dependability. Perfect for handling iron or steel in any form, hot or cold, and in all kinds of weather. Available in either welded or bolted construction, sizes ranging from 39" to 77".



RECTANGULAR MAGNETS

Cutler-Hammer Rectangular Magnets provide maximum lifting capacities with minimum magnet weight . . . also save in crane equipment and daily power consumption. Perfect for regular shapes such as sheet and bar stock, etc. Heavy duty rectangular magnets recommended for handling billets, ingots and slabs.



To solve your metal handling problem, look to Cutler-Hammer where you are assured not only the finest magnet on the market today, but the magnet that's perfect for your needs. Write today.
CUTLER-HAMMER Inc., 1325 St. Paul Ave., Milwaukee 1, Wis.